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S U R G E R Y

BY THE SAME AUTHOR

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THE

STUDENT'S AND JUNIOR PRACTITIONER'S GUIDE
TO THE MEDICAL PROFESSION

SECOND EDITION

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AN INDEX
OF
S U R G E R Y,
BEING

A CONCISE CLASSIFICATION OF THE MAIN FACTS AND
THEORIES OF SURGERY FOR THE USE OF
SENIOR STUDENTS AND OTHERS

BY

C. B. KEETLEY, F.R.C.S.

SENIOR SURGEON TO THE WEST LONDON HOSPITAL

FOURTH EDITION



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1887

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TO MY COLLEAGUES
ON THE COMMITTEE AND ON THE STAFF
OF THE
West London Hospital

THIS LITTLE BOOK IS DEDICATED
AS A TOKEN OF RESPECT AND FRIENDSHIP

The articles on OPHTHALMIC SURGERY, by Mr. JULER
and on OVARIAN and UTERINE SURGERY, by Mr. DORAN,
are placed at the end of the book, immediately before the
Index of Names.

PREFACE TO THE FOURTH EDITION.

NUMEROUS minor additions and alterations have been made throughout the work; but every effort has been made to make room for new matter by eliminating what could be spared of the old.

Mr. Wainewright has kindly corrected the proofs, and Mr. G. A. Webster the Index of Names.

It only remains for me to once more thank the profession for the favour they have shown this book.

C. B. KEETLEY.

10 GEORGE STREET, HANOVER SQUARE, W.
August, 1887.

PREFACE

TO

THE FIRST EDITION.

THIS BOOK is intended to be read by the senior student shortly before he goes in for his final examination, and after he has carefully studied a complete text-book of surgery. When I was about to present myself at the final examination for the Fellowship of the College of Surgeons, I felt the need of some such work. I had read not only more than one manual, but several special treatises and various essays. I had had at least ordinary opportunities of practical work, and I do not think I had wasted them. But I had made no complete series of surgical notes, nor could I possibly have made such a series without having unduly narrowed my reading or trespassed on the time spent in the hospital wards. And this very narrowing, still more this very trespassing, would have rendered me unqualified to make a good notebook at all. For, to make good notes, one should have some practical experience and some breadth of view. How many men have had to put aside as useless the notes once laboriously made, but made with unripe

knowledge, and with the bad judgment which such immaturity implies !

I am not dissuading students from taking notes while reading. The practice is highly to be commended, for various reasons; for instance, it rivets the attention—an essential part of memory—and it frequently results in a note-book of high value, well worth re-perusal. But the more honestly that note-book is made, the more likely will the student be to find the examination drawing swiftly near and his reading creeping along but slowly. He feels compelled to desert his note-book, and frequently his text-book too. He either skims on to the end of the latter, haste and anxiety preventing him from thoughtfully studying it, or he leaves it altogether for the smallest 'Introduction' to surgery in the language. Now an 'Introduction' or 'Elementary Handbook' has its proper place in education; but that proper place is not the time just before a final examination, especially when it comes in to thrust out a more profound and elaborate treatise.

If the student knew that there was a short book accessible, containing the main facts and theories of surgery put concisely, classified and arranged in due order, and without superfluous explanation, he would be able to really *study* his familiar text-book up to the last month before his examination, relying upon such a short book to give form to any knowledge which then remained nebulous in his mind.

These considerations convince me of the justness of the purpose of my book. Of its execution I will say

nothing. The shortcomings of a book which, insignificant as it is, deals with questions of life and death, can scarcely be excused ; they can only be lamented and condemned. But as I am convinced that it will do much more good than evil, and I believe I have done my best, I publish the work hopefully. These shortcomings would have been much greater if it had not been for the help in revision which has been given by Messrs. Alfred Street, Mills, Dunn, Alfred Back, Firth, and Charles Paget. Mr. Street has gone over the whole book. I cannot thank him too warmly. My friend and pupil, Mr. Charles H. Taylor, has made the Index of Names.

Messrs. Doran, Lyons, and Juler have added contributions on Ovariotomy, Toothache, and Ophthalmic Surgery respectively.

Mr. Juler desires acknowledgment to be made of the help given by Mr. W. Adams Frost and Mr. W. Langdon in the revision of the article on Ophthalmic Surgery.

Finally, I will express a hope that the practitioner, as well as the student, will occasionally find the book useful as a handy little work of reference.

20 PRINCES STREET, HANOVER SQUARE, W.

September 1881.

INDEX OF SURGERY

Abdomen, Contusions of.—Always examine patient very carefully, but gently. Diagnose whether the viscera are injured or not. Three things protect against injury to the deeper structures, viz. : 1, thick and muscular abdominal walls ; 2, empty state of the viscera ; and, 3, the patient's foreseeing and expecting the blow.

The parietal effects of a blow on the abdomen are : 1, rupture of muscle ; 2, mere bruising (which, however, may be very serious in extent) ; 3, rupture of the peritoneum, with consequent extravasation of blood into peritoneal cavity. Rupture of a muscle causes temporary paralysis, swelling, &c. Sometimes the separation of the parts may be felt. *Abscess* may follow contusion, burrow widely, and cause most troublesome sinuses. Hæmorrhage from ruptured peritoneum may be fatal. The collapse so produced is distinguished from the effect of ruptured intestine by the comparative absence of great pain and vomiting, and by positive signs of internal hæmorrhage. A blow on the abdomen may cause serious and even fatal collapse without visceral injury, possibly by damaging the abdominal sympathetic system. *Treatment.*—Attend to collapse, internal hæmorrhage, inflammation, and suppuration on general principles. Avoid purgatives.

When there is *injury to a viscus*, the particular one injured

depends chiefly upon the place where the force is applied. Each viscous presents special symptoms. Liver or stomach most commonly suffers.

Abdomen, Rupture of Viscera of :—

RUPTURE OF LIVER.—*Symptoms.*—Pain in hepatic region, signs of internal haemorrhage, peritonitis, bilious vomitings, white stools. Traumatic saccharine diabetes (Bernard). Rupture of fatty liver has been followed by fatty embolism, *q.v.*

RUPTURE OF GALL-BLADDER.—Great pain, collapse, and anxiety. Rapid death.

RUPTURE OF STOMACH.—Bloody vomiting, local pain, and general signs of abdominal injury.

RUPTURE OF INTESTINES.—Bloody stools, and signs of extravasation into peritoneal cavity or into extra-peritoneal cellular tissue. Most frequently affects the jejunum.

RUPTURED SPLEEN.—Severe internal haemorrhage.

RUPTURED KIDNEY.—Pain and bruise in loins. Blood and, if an abscess should form, pus in urine. Vomiting, retraction of testicle, numbness of thigh. Far less hopeless than injury of the other viscera.

RUPTURED URETER has occurred, causing a large accumulation of urine on the same side of the abdomen : recovery.

RUPTURED BLADDER. *Vide BLADDER, RUPTURE OF.*

Treatment of Ruptured Viscera.—Perfect rest, warm and moist applications to seat of pain, leeches if pain be severe, opium in small and repeated doses, a minimum diet—starvation if the intestines are believed to be wounded—then give frequent small nutrient enemata. No purgatives. Ice to suck.

If the diagnosis of rupture of a hollow abdominal viscous be probable, the indication is to open the abdomen with strict antiseptic precautions, to sew up the rent (after excising its edges unless the rupture be fresh), and to thoroughly cleanse the peritoneum of all extravasated matter. *See ABDOMINAL SECTION.*¹ A hopelessly injured and bleeding kidney might demand excision. *See NEPHRECTOMY.*

Abdomen, Wounds of.—Are either superficial or penetrating. Penetrating are of four classes : 1, without either

¹ See also No. 262 of *Volkmann's Clin. Lect.* (by Miculicz.)

injury or protrusion of viscera ; 2, with protrusion only ; 3, with injury and without protrusion ; and 4, with both injury and protrusion.

SUPERFICIAL WOUNDS.—*Their Treatment.*—Keep sides in apposition by sutures and a suitable position of the body, but beware of confining blood or discharge. 1, always secure the bleeding point in severe haemorrhage, enlarging wound if necessary ; 2, in slighter haemorrhage do not close wound till bleeding stops ; 3, open wound freely at least sign of suppuration. Part of abdominal wall which is wounded is liable to become seat of hernia. This may be prevented by the use of *buried* sutures (*see WOUNDS*). Foreign bodies of enormous size may be hidden away in these wounds.

SIMPLE PENETRATING WOUNDS.—Sometimes marked by escape of reddish serum. If sutures should be required, place them in layers through peritoneum, muscular planes, and skin separately ; give opium. Dress antiseptically, and as a rule do not probe. *Prognosis* fairly good.

WOUNDS WITH PROTRUSION OF UNINJURED VISCERA.—Cleanse with carbolic lotion (1-40) and return protrusion ; if necessary, snick edge of wound to make room. Omentum, if much injured, may be cut off after carefully ligaturing. See that the herniated viscera are fairly and entirely passed into abdominal cavity, and not slipped between muscles. Gangrenous bowel : leave it *in situ* to slough and form artificial anus. Dress with iodoform. If a large surface of peritoneum be exposed, use boracic lotion, or carbolic no stronger than 1-100.

WOUNDS WITH INJURY AND WITHOUT PROTRUSION.—Very serious. Possible escape of urine, faeces, bile, or gas through external wound. Extravasation into peritoneal cavity almost invariable. Other *symptoms* and *treatment* like those of concussion of abdomen with rupture of viscera. *Vide* above.

WOUNDS WITH BOTH INJURY AND PROTRUSION.—*Treatment.*—Restrain haemorrhage by ligature or clamp. Do not be anxious to return solid viscera if they are at all seriously injured. Sew up wounds of intestine with silk. Czerny-Lambert suture. Sutures not to pass through mucous membrane. Allow no food except ice and barley-water, for three or more days.

See also PERITONITIS (TRAUMATIC), FISTULÆ (GASTRIC and BILIARY), ARTIFICIAL ANUS.

Abdominal Aneurism. *See ANEURISM.*

Abdominal Section, General Remarks on.—This proceeding is adopted in various cases of intestinal obstruction, of ovarian, uterine, and oviductal disease; also for the excision of tumours of and connected with the stomach, spleen, liver, gall-bladder, intestines, pancreas, kidneys, bladder; for the removal of foreign bodies from the stomach; for the formation of a permanent gastric fistula in cases of œsophageal disease; to divert the course of the aliment in irremovable pyloric disease (gastro-enterostomy); for the removal of calculi from the gall-bladder, kidneys, and urinary bladder; and for the treatment of injuries of the abdominal viscera accompanied by extravasation or haemorrhage. *See notes on GASTROSTOMY, GASTROTOMY, INTESTINAL OBSTRUCTION, NEPHRECTOMY, NEPHROTOMY, OVARIOTOMY, PORRO's OPERATION, PYLORUS (EXCISION OF), SPLENECTOMY, &c.*

The course of wounds opening into the abdominal cavity is much modified both for good and evil by the absorptive powers of the peritoneum, and by its comparative laxness and extensibility: for good, because effused fluid is for the most part quickly absorbed, while even if a little remain it is not prone to cause injurious tension: for evil, because septic matter is as easily and quickly absorbed as harmless serum. It is the same with iodoform and other antiseptic drugs. Hence danger of poisoning by carbolic acid, especially if it should be impure.

Theoretically it will be seen that drainage is not a necessity after abdominal section, and, practically, the same is true, provided only antiseptic and antihaemorrhagic precautions be strictly and successfully taken.

The drainage *tube* is further objectionable after abdominal section, because it leaves a weak spot prone afterwards to be the seat of hernia.

For whatever object an abdominal section be done, the following general principles should be borne in mind:—

1. Every instrument and sponge which may by any chance have to be placed in the abdomen should be noted and counted.

2. The strictest antiseptic precautions should be used, at least as regards the hands, instruments, ligatures, sponges, &c.
3. All extravasation of any kind into the peritoneal cavity should be prevented if possible.
4. If prevention is not possible the cavity should be finally thoroughly sponged out and rendered aseptic.
5. Means of temporarily checking haemorrhage, e.g. forcipressure, will be found very valuable.
6. Not only the intestines, but every part of the patient's person, should be protected from unnecessary exposure and chilling during the operation. This rule includes the use of hot-water cushions, sponges wrung out in warm lotions, hot or warm douches, &c. It includes also caution in the use of the spray, which may be so misused as to chill thoroughly.
7. When the wound is closed, peritoneal surfaces should be carefully and closely brought into mutual contact.

The discussion on the above subject, opened by Sir Spencer Wells at the International Medical Congress, London, 1881, may be read with advantage.

Abscess.—A circumscribed collection of pus. Two chief kinds, *acute* and *chronic*. Term 'cold' is sometimes used as synonymous with chronic, and sometimes means a chronic abscess which has formed without any noticeable signs of inflammation.

ACUTE ABSCESS.—*Causes.*—Injury, irritation of a foreign body, follicular obstruction, absorption of poison, especially by lymphatics, and some obscure constitutional conditions. Ogston found micro-organisms in all acute abscesses. *Symptoms.*—Chills, rigors; temperature often rises suddenly to 104°. Local symptoms of inflammation. Throbbing pain, which becomes more dull and aching as pus forms. *Œdema* of skin. Fluctuation. The swelling, which is at first hard, gradually softens in centre. Pointing of abscess: the cuticle rises, the skin ulcerates or sloughs, and bursts. *Terminations.*—1, When opened either surgically or spontaneously, its walls fall together and it closes; or, 2, a sinus remains; 3, acute abscesses sometimes cause serious mischief by opening into blood-vessels and serous cavities; 4, blood-poisoning. This is most likely

to occur when extensive bone or joint disease or injury is co-existent. See *Acute Necrosis*. *Treatment*.—Local rest ; general rest in serious cases. Treat cause if possible. Hot moist applications. *Ung. belladonnæ*. Calomel (5 to 10 grains) if the tongue is not clean. *Indications for opening*.—1, When in sheath of a tendon ; or, 2, under strong fibrous membranes ; or, 3, anywhere else where pus is likely to burrow instead of coming to the surface ; 4, near a joint ; 5, under the periosteum ; 6, when pressure is likely to be dangerous ; 7, when it may cause some direct obstruction to some passage ; 8, when caused by some noxious infiltrating fluid, *e.g.* urine ; 9, when a spontaneous opening would produce deformity, *e.g.* in neck ; 10, when near anus. *After abscess is open*, employ simple forms of antiseptic dressing. *Method of opening acute abscess*.—1, By Paget's or Syme's knife or lancet ; 2, by Hilton's method when deep and in a dangerous situation. '*Hilton's Method*'—Incise skin and deep fascia ; then push a director on into abscess ; lastly, pass a pair of dressing forceps along director, and when they have entered the cavity, open the blades. Opening to be dependent, parallel with any neighbouring important structures, and free.

CHRONIC ABSCESS.—*Causes*.—Dead bone : all causes of acute abscess, *q.v.* *Tubercle*. *Signs*.—A swelling, at first hard, afterwards soft and fluctuating, usually situated near a lymphatic gland, or in some special situation, *e.g.* in the psoas muscle, or in loose cellular tissue, *e.g.* that of buttock. Often a certain amount of pain and tenderness ; often evident disease of bone. Pressure on nerves may cause pain or spasm. Abscesses near mucous canals sometimes, but rarely, become emphysematous. *Course*.—Often very tedious, usually tends to burst, either through skin or into some internal cavity, but usually the former. May remain stationary for years ; and may contract while its contents partly degenerate, partly are absorbed. *Constitutional Effects*.—Usually little or none till it opens and its contents are exposed to the air. Then, if antiseptic precautions be neglected, decomposition of its contents tends to occur, with high fever. (*Vide Hectic Fever, Septicæmia, &c.*) Liability to burrow, to open into important

vessels, and to cause injurious pressure effects. *Diagnosis*—From, 1, innocent and malignant tumours ; 2, aneurisms. 1, In cases of doubt, use trocar, grooved needle, or aspirator. 2, *vide ANEURISM*. *Prognosis* depends upon size, position, age of patient, curability of cause, and upon treatment. *Treatment*.—Remove cause. (*Vide CARIES, NECROSIS, TUBERCLE, &c*) If there is no great pain, or if there is no reason to suspect that burrowing is going on, opening may be delayed. An effort may, in exceptional cases, be made to obtain resolution by counter-irritation, iodine, mercurial plaasters, and rest. Various modes of opening—1, by knife ; 2, by trocar and cannula ; 3, aspirator ; 4, caustics. Free openings, counter-openings, drainage-tubes, repeated partial evacuations by aspirator, &c. *Antiseptic Treatment*, *quod vide*.

Chronic abscesses may sometimes be cured by evacuating their contents with an aspirator, injecting $\text{m}x\text{v}.$ of ethereal solution of iodoform (1-5), and repeating these procedures several times. (*Verneuil*.)

When the whole interior of a chronic abscess is accessible, it is often good practice to scrape its walls thoroughly with a sharp spoon, and then obliterate the cavity by the use of layers of buried sutures. Tubercular abscesses are frequently lined with a greyish membrane, which can be thoroughly scraped off, leaving healthy tissue beneath.

Acetabulum, Fracture of. *See FRACTURES.*

Acromion Process, Fracture of. *See FRACTURES.*

Actinomycosis.—A rare disease, caused by a parasitic fungus. Usually appears first as a soft, whitish tumour, attached to the lower jaw, but may affect the respiratory tract, intestinal canal, or elsewhere. A section at this period shows soft yellow foci, scattered on a reddish ground. Suppuration : the pus contains fungus-mycelia. Glandular infection. *Causes*.—Infection, probably often from oxen. *Prognosis and Treatment*.—Early and thorough operation can effect a cure. Outlook gloomy, perhaps hopeless when the disease becomes generalised.¹

¹ Good description and bibliography by Van Arsdale in *Annals of Surgery*, 1868, vol. ii. Cases by Treves, Shattock, and O'Neill in *Lancet*, 1884, 5, and 6. Also Israel's paper in the Essays edited by Cheyne for the Syd. Soc.

Acupressure.—Only under very special circumstances is acupressure now ever used. *Vide* Pirrie's and Sir James Simpson's writings.

Adams' and Alexander's Operation.—This ingenious and effective procedure, devised independently by the Glasgow and the Liverpool surgeon, but first performed by the latter, consists in drawing each round ligament an inch and a quarter or more out of the external abdominal ring, and fixing it by suture to the tissues in front of the pubes. The object is to hold a prolapsed and retroverted uterus upwards and forwards. (See *Glasgow Medical Journ.*, vol. i., 1882, *Liverpool Med.-Chir. Journ.*, 1882, and *Annals of Surgery*, vol. i. No. 5, 1885.)

Adenitis. *Vide* GLANDS, DISEASES OF.

Adenocele. Adenoma.—Glandular Tumour. A growth, the whole or part of whose structure resembles that of some gland. (But the term 'Lymphoma' is usually applied to any tumour resembling lymphatic gland.) When not pure these tumours are called Adeno-sarcoma, Adeno-myxoma, &c. *Occurrence.*—In the 'mucous polypi' of the nose, rectum, and uterus : *vide Polypi* ; in thyroid gland : *vide Bronchocele* ; in parotid, lips, tonsils, and skin. *Physical Character* : movable, rounded, ovoid, or lobulated. *Growth*, variable in rapidity. *Treatment.*—Divide capsule and enucleate in suitable cases. Also refer to articles *Polypi*, *Bronchocele*, *Breast*, *Tumour of*, &c.

Air-embolism. Air in Veins. *See* VEINS, AIR IN.

Alveolar Abscess. *See* TOOTHACHE.

Amputation (when through a joint it is termed *Disarticulation*).—*When required.*—For incurable and disabling disease, deformity, or injury of the part ; for disease which would take too long time in recovery (now an indication of rare occurrence, but formerly commoner because of tediousness of expectant treatment of joint-disease) ; to save life when nature, however assisted, would find it easier to heal the amputation wound than to cure the disease or injury ; for aneurism below or even above the site of operation ; for secondary haemorrhage.

General Principles.—1, Remove no more of a limb than is necessary ; 2, obtain sufficient coverings for the stump ; 3,

arrange that the cicatrix shall not lie on the end of the bone ; 4, do not take hopelessly unsound tissue into the flaps ; 5, take every precaution to check haemorrhage and to prevent its recurrence ; 6, cut the large blood-vessels transversely ; 7, remember the paramount importance of dressings and after-treatment.

Instruments.—1, Knives appropriate to each case ; 2, strong scissors, not too sharp ; 3, saw ; 4, bone-forceps ; 5, lion-forceps ; 6, common scalpels ; 7, artery-forceps ; 8, dissecting-forceps ; 9, ligatures ; 10, needles and sutures ; 11, dressings, sponges, retractors, towels, water, spray or arrangement for antiseptic irrigation, &c.

Assistants.—1, Chief, who sponges, secures arteries, &c., usually stands opposite operator ; 2, holds part to be removed ; 3, secures main artery, unless tourniquet be used ; 4, hands instruments when wanted ; 5, chloroformist. Number of assistants of course depends greatly on supply accessible.

Methods.—1, Circular ; 2, oval ; 3, flap ; 4, mixed of skin flaps and circular cut through muscles.

Steps.—1, Divide soft parts ; 2, saw bone (avoid splintering, cut off spiculae) ; 3, tie vessels and trim soft tissue ; 4, adjust flaps and insert drains and sutures ; 5, apply first dressings.

CIRCULAR AMPUTATION.—1, Sweep through skin and fat and dissect up for half diameter of limb, turning edge of knife slightly away from skin to avoid scoring the vessels which supply the skin-flap ; 2, sweep through muscles, ‘retracting’ all the time ; 3, still having the muscles well retracted, one or two inches, and having divided the periosteum by a sweep of the knife, saw through bone. Finish as directed above. Such is the usual practice. I often prefer to slowly divide the muscles, and, indeed, everything, except the skin and bone, with large scissors.

OVAL AMPUTATION.—See amputation of finger at metacarpo-phalangeal joint.

FLAP AMPUTATION.—Three varieties : 1, Double Flap ; 2, Rectangular (Teale’s) ; 3, One Long Flap.

Double Flap, may be lateral, antero-posterior, or oblique.

Cut thin flaps from without inwards, but thick and fleshy ones by transfixion, unless using scissors. Flap containing vessels to be cut last, and vessels cut long.

Rectangular Flaps (Teale's).—All the soft tissues down to the bone included in the flaps. Main artery to be in short flap. End of flaps square. Long flap: its length and breadth each equals half the circumference of the limb. Short flap: its length equals one-fourth that of long flap. Bones sawn exactly at angle of union of flaps, without any retraction.

Spence's Operation (a modification of Teale's).—No posterior flap; retraction instead. Anterior flap simply hangs down over bone.

Lister cuts an anterior rounded flap two-thirds diameter of limb in length; skin and enough muscle to cover bone. Posterior rounded flap (one-third limb's diameter), all skin. Posterior muscles cut as short as possible (to free flaps from effects of their contraction). Retract soft parts for two inches, and saw bone.

Single Flap amputation. *Vide* amputation at phalangeal joints of fingers.

SKIN FLAPS AND CIRCULAR INCISION THROUGH MUSCLES.—Cut two skin-flaps by dissecting from without inwards. Then finish as in circular amputation.

Esmarch's Operation.—This is specially planned for the use of buried sutures. Two short lateral skin-flaps, circular through muscles, circular through periosteum; bone sawn higher up: afterwards, periosteum, muscle layers and skin sutured separately. This is an excellent plan when properly carried out.

Hæmorrhage during amputation to be prevented temporarily by digital pressure on main artery, by tourniquet, or by Esmarch's bandage.¹ Afterwards, ligature—by silk, hemp, or catgut—torsion or acupressure is to be employed. Sponging with cold or with hot water to stop oozing.² Actual

¹ Lister pointed out that a limb can be emptied of blood almost as thoroughly by mere elevation as by the compression of an elastic bandage. In many cases compression is very undesirable.

² See *Practitioner*, Feb. 1879.

cautery to check obstinate bleeding from bone. Sponge-pressure.

Muscles retract greatly in traumatic cases, but very little in limbs affected with old disease. *Knife* to be used with a free sawing motion. Parts to be relaxed during transfixion. Commence *sawing* the bone by drawing the saw back to make a groove.

Mortality after Amputation.—Chief causes : 1, shock ; 2, secondary haemorrhage ; 3, pyæmia (in nearly half the fatal cases) ; 4, erysipelas ; 5, phlebitis ; 6, congestive pneumonia. Besides which, 7, hospital gangrene, 8, sloughing of stump, and, 9, tetanus, occasionally carry off patient. Pyæmia most common after traumatic, rare after chronic disease cases. The practice of antiseptic surgery greatly diminishes all these risks except No. 1. For its prevention and cure, *vide* SHOCK.

Circumstances affecting Patient's chance of Recovery.—Two classes : 1, constitutional conditions ; 2, circumstances of operation itself. Class 1 : age, general health, and hygienic conditions. In amputations of the lower extremity, child's twice as good as a young man's, three times as good as an old man's. Class 2 : seat of amputation, structure of bone sawn through ; whether amputation is for injury or disease ; nature of the affection ; time after the injury. Diseased kidneys, town life, amputation high up a limb, amputation for injury, or through much cancellous tissue of bone—all these darken the prognosis. Nature of disease : after chronic disease, prognosis good ; malignant or tuberculous disease, bad ; acute suppurative disease of joints, very bad. Time after injury ; *primary* or *secondary*. Primary are such as are done within thirty hours of the injury. Secondary are amputations done after suppuration has occurred. Primary always more dangerous than secondary, except in amputations of the upper extremity done in civil practice. Death after primary amputation usually caused by haemorrhage, shock, or exhaustion ; after secondary, by erysipelas, pyæmia, &c. But with antiseptic precautions, not only may non-hygienic surroundings be more or less defied, but even diseased kidneys lose much of their power for evil.

AMPUTATION AT ANKLE.—*Pirogoff's*.—Resembles Syme's.

But the lower incision extends from one malleolus to the other across the sole of the foot, and inclines forwards and downwards ; while the os calcis is sawn through obliquely, downwards and forwards, just behind the articular surfaces for the astragalus. The posterior piece of the os calcis is then placed in apposition with the tibia, whose articular surface is previously sliced off. Wire the os calcis to the tibia, or retraction will almost certainly take place.

Syme's Amputation.—Inner angle of incisions is three-quarters of an inch below and behind inner malleolus ; outer angle exactly opposite outer malleolus. Upper incision has an angle of 45° to sole of foot ; lower incision inclines downwards and somewhat backwards. Os calcis may be dissected from heel-flap either before or after disarticulation at ankle, *i.e.* either from below or from above. Syme dissected out os calcis from below, and disarticulated afterwards. Avoid scoring flap. The anterior tibial and both plantar arteries, and not the posterior tibial, are divided.

Amputation at the Ankle for Ulcer of the Leg.—A man asked to have his leg amputated for an intractable ulcer of the front and sides of his leg (lower two-thirds). I removed the same amount of bone as is taken away by a 'Syme,' but preserved all the soft tissues of the sole and sides of the foot as far as the toes and, with them, covered the site of the ulcer (previously scraped). See *Lancet*, 1885.

ARM, AMPUTATION OF.—*Upper Arm.*—Double flap by transfixion often employed. Also circular and mixed operation. Arteries divided : brachial, superior profunda, and inferior profunda.

Fore-Arm.—In upper and lower thirds prefer skin-flaps and circular through muscles (T. Smith). Arm to be held either supine, or midway between supination and pronation. Arteries : radial, ulnar, anterior and posterior interosseous.

Elbow-Joint, Disarticulation at.—Seldom done. Best to cut a large anterior flap (Lister).

Instead of disarticulation, preserve the upper extremities of the radius and ulna if possible ; very short flaps will suffice to cover them, and make a satisfactory stump.

FINGERS, AMPUTATION OF.—Usually done by disarticulation. To remove the second or third phalanx, cut a single palmar or double (palmar and dorsal) flaps. As the heads of the bones form the knuckles, the articulations are just in front of the knuckles. In case of injury, here as elsewhere, ‘cut according to your cloth.’

Metacarpo-phalangeal Disarticulation.—So-called ‘oval,’ really ‘pyriform’ incision. Commence half an inch posterior to head of metacarpo-phalangeal joint, carry incision right round palmar surface of base of finger and back again. Divide lateral ligaments, twist the bone out of its place and remove it. Extensor tendon should be cut by first incision. Removal of head of metacarpal makes hand more slightly, but much weaker.

FOOT, AMPUTATIONS THROUGH.—*De Lignorelles’.*—Removes all the bones of the tarsus, except the astragalus. Heel and dorsal flaps.

Hancock’s.—Leaves the astragalus and posterior end of os calcis, on the principle of Pirogoff’s.

Chopart’s.—Between scaphoid and cuboid on the one hand, and astragalus and os calcis on the other. Long plantar flap, reaching to roots of toes; very short dorsal flap. Incisions commence, on inner side, just behind prominence of scaphoid; on outer side, one inch behind base of fifth metatarsal bone. Beware of opening ankle-joint. Disarticulate before cutting plantar flap. Plantar flap to be longer on inner than outer side. *Arteries*: dorsalis pedis, plantar and digital.

Trippier’s.—A real improvement on Chopart’s. The astragalus and the upper part of the os calcis are left. The latter bone is sawn through just below the level of the sustentaculum tali and in a plane at right angles to the axis of the tibia (the patient being assumed to be standing). The intention is to escape the retraction so often consequent on a Chopart. The question is fully discussed by T. H. Markoe (*Ann. of Anat. and Surg.*, N. Y., Feb. 1883); also Hayes, *Dublin Journ.*, Dec. 1881.

Lisfranc’s (commonly called *Hey’s*).¹—Between tarsus and

¹ Hey’s operation differs from Lisfranc’s, in that the former saws through the second metatarsal bone.

metatarsus. Long plantar flap, reaching to roots of toes, longer on inner than on outer side. Dorsal incision nearly transverse, with only slight convexity forwards. Ends of incisions, on inner side, one inch before tubercle of scaphoid, on outer side just behind base of fifth metatarsal. In disarticulating, remember dovetailing of second metatarsal bone into cuneiform bones, and the obliquity of cuboido-metatarsal joint. Cut plantar flap from behind forwards after disarticulation, but cut its borders deeply down to bone when commencing operation. *Arteries* : dorsalis pedis, plantar and digital.

HAND, AMPUTATION THROUGH.—Not a single fragment of bone should be unnecessarily removed. The flaps have usually to be taken from where soft tissues are most available.

HIP-JOINT, AMPUTATION AT.—Six ways : 1, long anterior flap ; 2, double flap, anterior and posterior ; 3, lateral flaps ; 4, Jordan's amputation ; 5, Ollier's ; 6, with preservation of great trochanter. Use Davy's lever per rectum ; or a plan of Jordan Lloyd's, viz., placing a pad over the external iliac, and securing it by an elastic band carried obliquely round, internal to the tuber ischii, across the pubes, and above Poupart's ligament. The tendency to slip down has to be opposed by an assistant. Newman and Trendelenburg use a kind of large acupressure, transfixing with a steel rod and passing a figure-of-8 elastic bandage over its ends. (For details, see *Glasgow Med. Journ.*, 1882, p. 150.) Let patient's buttocks project beyond edge of table, tie body and sound limb to table, have three assistants, and stand on left side of limb. Chief assistants : 1, takes charge of flap and pays greatest attention to instantly stopping all haemorrhage ; 2, manipulates limb : he has mainly to prevent locking of operating-knife, especially by keeping great trochanter out of the way ; 3, controls lever or Esmarch's band.

Long Anterior Flap Operation.—Left hip : transfix from a point midway between ant. sup. spine of ilium and great trochanter to another point just in front of tuberosity of ischium. Knife should pass behind femoral vessels and lay open hip-joint. Right hip : transfix in the same way, but in the opposite direction. Other operative procedures same for both right

and left limb. Length of flap, eight or ten inches. Next, draw knife across capsule of joint, opening it freely. Divide ligamentum teres and external rotators. Cut vertically downwards through remaining soft parts.

Manipulations by Assistant having charge of limb.—1, Whilst anterior flap is being formed, flex slightly, adduct, and rotate inwards. Then extend and rotate outwards, till, the ligaments being divided, head of femur leaves its socket with a sucking noise. Then, again slightly flex, adduct, and pull out forcibly. *Arteries* : femoral, profunda, obturator, sciatic, and minor branches.

Double-flap Amputation.—Manipulations and proceedings resemble preceding ; but there are two flaps—anterior, five inches, posterior, four inches long. In cutting posterior flap, have limb rotated inwards to clear great trochanter.

Lateral Flaps.—External is composed of skin. Internal, of skin and muscle, is cut from within outwards. Angles, where flaps join, are : in front, just outside femoral vessels ; behind, close to tuberosity of ischium.

Jordan's Operation.—The head and upper part of the femur are first reached by a longitudinal and external incision ; when they have been cut free and dislocated, the limb is finally detached by a circular amputation of the soft parts as far down the thigh as circumstances will permit.

An American idea is to preserve the great trochanter in Jordan's amputation.

Ollier's.—Like Jordan's, but the periosteum is preserved. New bone is formed. The late Mr. James Shuter was one of the first surgeons, if not the first, to operate in this way.

Upon the presence or absence of a little bone in the stump perhaps depends the ultimate control over an artificial limb. As a rule, an artificial limb is useless after disarticulation of the hip, and the patient uses crutches permanently. When disarticulating at the hip for *morbus coxae*, the greater part of the shaft of the femur may be safely preserved in the stump, if the diseased medulla be removed. However far down the shaft of the femur tuberculous disease may have extended from

the head to trochanteric region, it is generally confined to the medulla, and, with safety, this can be scraped out and the cavity treated with powerful germicides. Indeed, the sinus-riddled soft tissues left by Jordan's amputation for suppurating hip-disease are more dangerous than the compact and empty cylinder of a scraped-out femur.

I prefer, also, in exarticulating at the hip, to divide the operation into two stages done on separate days, so that the patient has time to recover from the excision of the hip, before the limb is cut off. The removal of the limb can be done almost without haemorrhage and practically without shock : not so the excision.¹

When done for injury, amputation at hip-joint is almost always fatal.

KNEE-JOINT, DISARTICULATION AT.—Chief methods : 1, anterior skin-flap ; 2, antero-posterior double flaps, either the anterior or the posterior being the longer ; 3, long posterior flap (usually including flesh) ; 4, lateral skin-flaps ; 5, anterior and posterior skin-flaps, with circular incision through muscles ; 6, a circular (or very short flap with retraction) amputation. A very good method. Wire the patella and suture the skin so that the scar may be chiefly longitudinal and lie between the condyles behind. The patella is generally left, and almost invariably becomes retracted towards the front of the femur, unless it is fixed by suture. Incisions in lateral flap method begin one inch below tubercle of tibia. Flaps to be somewhat spare. Cartilage to be left, unless diseased.

LEG, AMPUTATION OF.—Any one of the ordinary methods can be used ; but double skin-flaps and circular through muscles are very good. Care should be taken not to lock the knife between the two bones, and not to turn its edge upwards in cleaning between the bones. The sharp anterior edge of the tibia should be bevelled off with the saw. Sawing through the fibula should always be completed before the division of the tibia.

PENIS, AMPUTATION OF.—Clover's clamp or tape to check

¹ See *Annals of Surgery*, Dec. 1885.

haemorrhage, or a piece of lead pipe can be used as a tourniquet. Corpus spongiosum to be cut half an inch longer than C. cavernosa. Urethra to be split into three and sewn to skin. Skin to be divided higher up than the 'corpora,' i.e. the very reverse of the principle adopted in amputating a limb. Gould entirely removes the corpora in cases of cancer.

SHOULDER-JOINT, AMPUTATION OF.—Three chief methods, viz. : 1, lateral flaps ; 2, anterior and posterior flaps ; 3, oval incision. But in cases of injury to upper arm, almost any operation may be expected to give a satisfactory stump.

Lateral Flaps.—You may transfix in cases of injury. Cut from without inwards when for disease. Knife, narrow-bladed. Three assistants : 1, holds the limb ; 2, raises the flap ; 3, follows the knife as it cuts behind the humerus, and grasps the inner flap with the axillary artery. Subclavian may be compressed. Position of operator : for right limb, stand before ; for left limb, stand behind. Right side : enter knife midway between acromion and coracoid process. Left side : enter well behind spine of scapula, at posterior border of axilla. Outer flap should contain most of deltoid. Secondly, open capsule, divide muscles attached to great tuberosity (arm rotated inwards) and subscapularis (arm rotated outwards). Thirdly, having dislocated head of humerus, pass knife behind it and cut down for a distance of three inches, keeping close to inner side of bone (so as not to divide artery too soon). Then complete inner flap by turning edge of knife inwards and cutting through. *Arteries* : axillary, circumflex, subscapular, &c.

Oval Amputation.—When uncertain whether to resect joint or amputate, perpendicular incision may be made as for resection (*quod vide*), and the joint examined. Then, if desirable, the limb can after all be removed by cutting obliquely right round the limb from and to the lower end of the longitudinal incision. This is Spence's plan.

The principle of Jordan's or of Ollier's hip amputation can also be applied to the shoulder, when it is uncertain how high up the humerus is diseased or injured.

Whenever it can possibly be done, the head of the humerus,

or at least the greater tuberosity, should be preserved. The ultimate result, as regards personal appearance, is wonderfully better than that of complete disarticulation. In cases of very severe injury to the arm requiring amputation, the possibility of saving a small piece of the humerus would be discoverable after the first, or perpendicular, incision had been made for amputation by the oval method.

THIGH, AMPUTATION OF.—*Methods.*—1, Gritti's; 2, Carden's; 3, Spence's; 4, lateral flaps; 5, circular; 6, double flap by transfixion; 7, mixed; 8, Teale's.

Gritti's.—Done 'just above condyles with an anterior flap, in which the patella is preserved, its surface being sawn and applied to the cut surface of the femur.' Incision extends from upper end of fibula to inner side of joint, reaching downwards below patella. In this, as in other operations where there is a tendency to separation of two bony surfaces which it is desired to unite, the best results can only be secured by drilling and 'wiring.'

Carden's.—Through the condyles. Single anterior flap. Circular cut through deeper parts. Slight retraction of them before sawing bone. *Advantages*: the medullary canal not being opened, there is less risk of pyæmia (?). The skin of knee is accustomed to bear weight of body in kneeling, &c. *Arteries*: popliteal and some of its branches.

Spence's.—Long anterior; no posterior flap; circular cut through muscles; retract two inches and saw bone.

Lateral Flaps.—Only to be recommended when buried sutures are used. See *Wounds*.

Arteries.—Femoral, profunda, external, circumflex, anastomotica magna if flap reaches low down, muscular branches.

THUMB, AMPUTATION OF.—1. At *Carpo-metacarpal Joint*.—Incision along dorsum of metacarpal bone commencing at palmar side of trapezio-metacarpal joint and ending at web of thumb. Flap from ball of thumb, by transfixion. Right thumb: transfix first. Left thumb: transfix after making dorsal incision. Operator should stand beside the hand or forearm, not in front of it; otherwise his own left hand will get in his way. Beware of locking knife under sesamoid bones; and keep close

to metacarpal bone, to avoid wounding radial artery. *Arteries: dorsales and arteria magna pollicis.*

2. *Thumb at Metacarpo-phalangeal Joint.*—Oval amputation.

Remove no more of thumb than is absolutely necessary.

TOE, GREAT.—At *Tarso-metatarsal Joint.*—Two methods, flap and oval.

1. *Flap.*—Cut a flap from whole length of inner side of metacarpal bone. Better not transfix for this. Then transfix between first and second metatarsals, and cut downwards right through web of toes. If possible, save base of metatarsal bone; otherwise divide tendon of peroneus longus and disarticulate. Beware of sesamoid bones, and of dividing communicating branch between dorsalis pedis and external plantar artery at base of interosseous space. *Artery divided always: first digital.*

2. *Oval Amputation.*—Commence incision half an inch posterior to where the bone is to be divided or disarticulated.

TOES.—Amputated in same way as fingers.

Anæsthesia.—The term usually applied to the production of insensibility to pain for surgical or medical reasons. This state is induced for five purposes. 1, To prevent the pain of operations or examinations; 2, to facilitate such proceedings as the reduction of dislocations and herniæ; 3, where spasm interferes with diagnosis; 4, where hysteria or malingering is suspected; 5, as a curative agent, *e.g.* in puerperal convulsions.

Anæsthetics are either general or local. General anæsthetics in ordinary use: 1, ether; 2, chloroform; 3, a mixture of chloroform, ether, and alcohol; 4, bichloride of methylene; 5, nitrous oxide gas.

Their physiological action consists in paralysing temporarily almost all the nerve-centres, except those necessary to maintain life.

Advantages and Disadvantages peculiar to each.—Nitrous oxide is the least dangerous, but it is inconvenient for long operations. It is, emphatically, *the anæsthetic for short operations.* Bichloride of methylene has a quick action and causes

little vomiting. Recovery is rapid ; but it is more dangerous than ether, and perhaps as dangerous as chloroform. It is used in ophthalmic surgery and for ovariotomy. Chloroform has a quick and powerful action, is comparatively agreeable to take, and seems safe enough for young children, but for adults and adolescents is more dangerous than ether. It frequently causes vomiting. Ether is safe and powerful, and not much slower than chloroform when properly given. On the other hand, the patients sometimes require strong assistants to manage them in the stage of excitement ; and in old bronchitis bronchial irritation is produced. As air should not be mixed with ether, it is not adapted for operations about the mouth. The mixture of alcohol, chloroform, and ether is much liked at Guy's Hospital. (Chloroform has been said to be quite safe for parturient women, but several deaths have been recorded.)

Modes of Administration.—Always see that all buttons and braces about neck and chest are loose, and that the mouth is empty of artificial teeth, tobacco, &c. In operations about the mouth the patient should sometimes be turned on his side. Prone position permissible if required. Carefully watch respirations and pulse, especially the former.

1. *Ether.*—An inhaler¹ is used which permits of the gradual change of the strength of the inhalation from pure air to air saturated with ether vapour. Ether can be administered in a towel folded conically with a sponge at the bottom, or in a cone of mackintosh lined with felt ; but this is an extravagant method, especially in hot weather. Two ounces are not too much to begin with, and the drug should be administered boldly, especially in the stage of excitement. If the drug be pushed vigorously then, complete anæsthesia usually follows immediately ; if indecision or timidity be displayed, the patient's struggles last a long time. No air should be allowed to get under the apparatus, which should be held firmly down over mouth and nose. Patient may pull it off, unless assistants are

¹ Every inhaling apparatus should be thoroughly cleansed and asepticised before being used again. For ether inhalers Mr. Rickard W. Lloyd has most ingeniously contrived a bag so cheap that a new one can be used for each patient.

arranged before commencing so that they may be ready to restrain the patient the moment restraint is necessary. 3*j.* of ether may be put into the cone from time to time. The patient's face is red and congested, and his breathing apt to be stertorous. Much saliva is secreted.

2. *Chloroform*.—Recumbent position. Clover's inhaler. Other inhalers. Piece of lint. Towel. Allow free access of air. Commence gently. Pour 3*ss.* upon the towel to begin with. In operations about the mouth, nose, &c., the chloroform vapour may be pumped through a catheter, which gets less in the surgeon's way than do larger apparatus. In these operations, also, the catheter may be passed through the glottis and surrounded with a distensible bag wherewith to block the larynx against ingress of blood. Or tracheotomy may be done, and the catheter, &c., passed through the tracheal opening.

2A. It is an excellent plan to administer successively, nitrous oxide, a mixture of it with ether, and lastly ether alone. Mr. Clover contrived an apparatus which answers this purpose admirably. No stimulant should be given before administering ether. Pure anhydrous washed ether always to be used. Robbins' ether for local anæsthesia is dangerous.

3. *The mixture*, of alcohol 1 part, chloroform 2 parts, and ether 3 parts, is to be given like chloroform.

4. *Bichloride of Methylene*.—3*j.* is placed in Rendle's apparatus. This is a cone of leather lined with flannel, has small perforations at the apex, and is held close over the mouth and nose, as in giving ether.

5. *Nitrous Oxide Gas*.—Is given perfectly pure, from a bag, which is replenished from an iron bottle, which contains the gas compressed to a liquid state. Safe as this anæsthetic is, the appearances produced are somewhat alarming.

Causes of Danger from Anæsthetics.—1, Sudden stoppage of respiration, either from paralysis of nerve-centre, or from spasm of larynx, or from mechanical obstruction, *e.g.* falling back of the tongue, or passage of blood or some foreign body, *e.g.* food, false teeth, or even a quid of tobacco, into larynx ; 2, sudden paralysis of the heart. But it would appear that

heart-disease does not contra-indicate anæsthetics ; and ether is a powerful cardiac stimulant ; 3, shock.

Precautions.—1, Do not push the anæsthetic too much at first. Be careful about the quantities used ; 2, allow plenty of air with chloroform ; 3, recumbent position, especially with chloroform, though not required with gas ; 4, loosen all tight coverings on chest and neck ; 5, have ether of the right quality ; 6, it should be possible to let a free supply of fresh air into the room if necessary ; 7, administrator should confine his attention to the administration only ; 8, he should carefully watch the pulse and respiration ; 9, see that the patient has had no food for several hours, and that the mouth is empty before administration ; 10, keep ether vapour from contact with flame or cautery.

Treatment of Dangerous Symptoms.—Pull the tongue out of the mouth, or push the chin up. Clear the throat out if there be any suspicion that blood, vomited food, or anything else, is obstructing the larynx. This failing, tracheotomy may be found justifiable. Artificial respiration. Galvanism : one pole on the throat near the phrenic nerve ; the other in pit of stomach. Hot affusion to head. Perpendicular position, with head downwards. Eben. Watson argues against this on the ground that it tends to further gorge the already overfull right heart (*Lancet*, March 10, 1883). As much fresh air as possible.

LOCAL ANÆSTHETICS.—Extreme cold produced.—1, Ice and salt ; or, 2, ether spray. Use twice as much powdered ice as salt in a gauze bag. Useful for small operations on the skin or about the nails : excision of small epitheliomata, &c.

Cocaine.—A new, most useful, but rather expensive local anæsthetic, introduced by Kölle, and extracted from *erythroxylon coca*. Solutions of from 4 to 20 per cent. in water are brushed on the part, usually several times at intervals of five minutes. Especially useful for operations on mucous membrane. Deeper parts can be anæsthetised by subcutaneous (or submucous) injection of a few drops. Innumerable papers have been written on this subject. A useful one is Jessop's (*Practitioner*, January 1885). H. P. Dunn applies it with a

spray-producer (*Brit. Med. Journ.*, June 13, 1885). Poisoning is possible by its excessive use, and some persons are very susceptible to its influence. Its effects are said to be prolonged and intensified by applying an Esmarch's bandage above the injected region five minutes afterwards.

Anchylosis. *See ANKYLOSIS.*

Aneurism.—A considerable dilatation of an artery, or any hollow tumour communicating with the interior of an artery.

Classification.—According to the relation of its sac to the wall of the artery, into—1, true ; 2, false ; and 3, dissecting aneurism. According to its shape, into fusiform and sacculated. And, according to its apparent cause, into spontaneous and traumatic. Cirsoid aneurism and varicose aneurism not usually included in this classification.

A *true* aneurism used to always mean one whose sac consisted of all three arterial coats. The term, rarely now used at all, often means merely that the sac is formed chiefly by the wall of the artery. *False*, in the same way, may mean either that the sac is wholly, or that it is chiefly, formed of tissues outside the artery. *Dissecting* aneurisms are formed when the blood burrows between the coats of an artery.

Causes.—Dilated arteries are almost always found to be atheromatous (*vide Arteries, Atheroma of*).—1, Occupation : soldiers, sailors, employments where severe and prolonged efforts are required irregularly. Soldiers are chiefly liable to thoracic, sailors to subclavian and axillary aneurisms (probably from climbing, &c.) ; 2, abuse of alcohol ; 3, syphilis ; the liability of soldiers is partly attributed to the latter two causes, and partly to the strain on the thoracic organs, caused by the old-fashioned stock and knapsack ; 4, strains ; 5, age : very rare in childhood, commonest between thirty and forty ; 6, *traumatic* aneurisms are caused by direct wounds.

Pathology.—An idiopathic aneurism begins by the dilatation of a diseased part of the wall of some artery. The whole wall may be so softened as to dilate ; but usually the inner coat is ulcerated, and then, from the first, the aneurismal sac consists only of the outer and part of the middle arterial coat. But always, before the tumour reaches the size of an average

orange, all trace of distinction between the arterial walls and the surrounding tissues is lost in its sac. In the meantime, wherever the inner coat of the artery is absent, the blood tends to deposit layer after layer of fibrin ; the outer layers, after a time, have become organised and pale, while the inner are still soft and dark-coloured. Fusiform aneurisms have the inner coat of the artery comparatively sound, and only a few shreds of fibrin adhere to their walls. The wall of an aneurism itself tends to thicken and strengthen. Adjacent parts are pressed upon, nerves are irritated or paralysed, ducts obstructed, bones absorbed.

Symptoms.—Patient generally applies for advice either because of the swelling, or of the pain caused by the pressure of the tumour ; but the earliest symptoms are generally those of slight muscular weakness of the limb. Tumour, in the course of some artery, soft at first, harder as it progresses. Pulsation expansive. Bruit, loud and rasping, or soft or altogether absent. Pulse below aneurism weak. Often œdema, dilatation of cutaneous veins, neuralgia, spasm or paralysis from pressure on veins or nerves. Compress artery above, tumour less tense or smaller ; compress artery below, tumour may become larger or more tense. The tumour can often be partially emptied by pressure, especially when in ‘the first stage,’ as Spence calls the period before clots have formed within it.

Diagnosis.—May be confounded with—tumours, or abscesses, in the course of large arteries ; malignant tumours of bone ; or mere enlargement and relaxation of the artery. It is always to be borne in mind that the pulsation of an aneurism is heaving, while that of a vascular tumour is usually sudden and more abrupt ; also, that aneurisms do not always pulsate,¹ and that when an aneurism is emptied by pressure, it gradually returns to its full size. *Diagnosis from Tumours and Abscesses pressing on the Artery.*—1, such swellings mostly have no bruit ; 2, their pulsation is an equable rise and fall, and not expansive ; 3, an abscess probably shows signs of

¹ For diagnoses, &c., of aneurisms which do not pulsate, see Holmes, in *Brit. Med. Journ.*, Jan. 1880, and Morrant Baker, in *St. Barth.'s Hosp. Rep.*, 1879. Auscultate and observe the effect of pressure on the main artery.

suppuration (but an aneurism may suppurate too) ; 4, the tumour can often be dragged off the artery which communicates to it its pulsation.

Diagnosis from Pulsatile Tumours of Bone.—1, Bruit in pulsatile tumour rarely so well marked, and often absent ; 2, pulsation more sudden and less expansive ; 3, signs are often to be found in the state of the neighbouring bone ; perhaps a plate of bone may be felt in the tumour. Pulsatile tumours may dilate the bone : aneurisms cut a clean hole through bone ; 4, these tumours being almost always cancerous, may be accompanied by other signs of cancer. *Diagnosis from Aneurismal Dilatation.*—By the absence of all marked symptoms of a genuine aneurism.

Prognosis.—Spontaneous cure does sometimes occur, but very rarely. Without treatment a fatal event from bursting of the sac is to be expected. With treatment the patient's chance depends mainly on the situation of the aneurism, partly on its cause, the fitness of the case for operation, and on whether the aneurism be single or multiple.

Course.—Enlargement in size ; formation of layer after layer of coagulum ; absorption, first of adjacent parts, and next of the aneurismal sac itself. Then one of the following terminations :—

Terminations.—1 (Most common), rupture of sac and death ; 2, escape of piece of clot, embolism beyond aneurism, and spontaneous cure ; 3, suppuration of sac : 4, flow of blood through aneurism checked by its own growth and pressure on artery above ; 5, coagulation may go on to so great an extent as to fill sac with fibrinous laminæ, and stop pulsation and further enlargement ; 6, the condition may remain stationary. All these events, except the first and sixth, may cause spontaneous cure. But the third may cause fatal haemorrhage. Aneurisms burst through serous membranes with a large opening, causing instant death, but through mucous membrane and skin with a small opening, so that death is preceded by several haemorrhages.

Treatment.—Classified into internal or medical, and external or surgical. Every method aims at producing a clot which

shall stop the growth of the aneurism, excepting the method of Antyllus. *Surgical Treatments* are : 1, ligature (Anel's, Hunter's and Brasdor's operations) ; 2, pressure (instrumental and digital) ; 3, flexion ; 4, use of Esmarch's bandage (Reid) ; 5, acupressure, temporary ligature, and Fleet-Speirs' artery-constrictor ;¹ 6, manipulation ; 7, galvano-puncture ; 8, coagulating injections ; 9, wire in the sac.

1. *Ligature. Method of Antyllus.*—Operation.—Command artery above aneurism. Open sac and turn out clots. Find the arterial orifices opening into it, and tie the artery above and below aneurism, controlling haemorrhage in the meantime by pressure with the fingers. When suitable : 1, in gluteal aneurisms ; 2, axillary aneurisms ; 3, traumatic aneurisms at bend of elbow ; 4, when an aneurism has been opened accidentally ; 5, when the sac has burst.

Hunterian Operation.—Artery tied at point of selection above aneurism. Operation.—Instruments : scalpel, forceps, retractors, artery-forceps, ligatures, aneurism-needle, &c. Observe landmarks, incise or separate structures to expose sheath of vessel, make a very small opening in the sheath, gently separate artery from sheath at point selected. Pass aneurism-needle from the side where vein lies. The great advantages of Hunter's operation are, that artery is most likely to be healthy and certain to be accessible at the part chosen.²

Anel tied the artery immediately above the aneurism.

Brasdor's Operation.—Artery tied on distal side of aneurism. Chiefly applicable for aneurisms at root of neck.

2. *Pressure.*—Either (1) direct, *i.e.* upon the aneurism itself (very unusual) ; or (2) upon the artery. Effected either by the fingers or by mechanical contrivances, *e.g.* Carte's tourniquet or P. H. Watson's weight-compressor. The treatment by Esmarch's bandage should be classed as a treatment by pressure. Under anaesthesia almost any aneurisms, except the thoracic, may be treated by compression ; and certain thoracic aneurisms might, perhaps with advantage, be treated by distal

¹ See *Brit. Med. Jour.*, 1882, vol. ii. p. 721.

² L. A. Stimson argues that, in regard to this operation, Hunter has received the credit which more justly belonged to Desault. *Annals of Surgery*, Jan. 1885.

compression of the carotid, &c., on the principle of Brasdor's operation. Statistics of results much better than those of ligature. But prolonged, unsuccessful compression sometimes appears to make worse the prognosis of a subsequent operation for ligature.

Prepare the patient by rest in bed and limited diet (both as to fluids and solids). Chloral if necessary. Ether may be given. J. C. Warren (Harvard University) relates a case in which it was administered almost continuously for 12 hours. $2\frac{1}{2}$ lbs. were consumed ! (*Lancet*, April 28, 1883). Bandage limb, shave seat of pressure and dust it with hair-powder. If pressure be instrumental and there be room, apply two instruments to the artery and use them alternately. Keep bed-clothes well off the tourniquets. Patient may sometimes be instructed to manage his own treatment. Use the minimum pressure absolutely necessary to check the flow of blood. Keep it up continuously, even during sleep if the patient can be got to bear it. In compressing the abdominal aorta or the iliacs, it is best to produce anaesthesia and keep it up for hours. Aneurisms may thus be cured by one spell of compression.

Digital compression requires relays of assistants. A weight should be suspended so as to press down on the assistant's fingers, and supply the compressive force. Duration of pressure treatment, very variable, often a month ; in some cases cure has resulted in a few hours.

3. *Flexion*.—Applicable to aneurisms situated in the flexures of joints, *e.g.* popliteal, and on the superficial aspect of the artery. Bend the limb, not too acutely at first, and fix it thus with straps, buckles, or bandages. Rest in bed and restricted diet as accessories. Slight simultaneous compression of artery above sometimes advisable. (See Ernest Hart, *Med.-Chir. Trans.*, vol. xlii. p. 405.)

4. *Esmarch's bandage* should be applied, under anaesthesia, and may be kept on for two hours or more. (Dr. W. Reid, R.N.) But one application for one hour has sometimes been found quite sufficient. Compression of the artery should be kept up for several hours after the bandage is removed.

For statistics and analysis, see Pearce Gould in *Trans. International Medical Congress*, 1881.

Introduction of coagulants.—See an article by Pearce Gould in *Annals of Surgery*, July 1886.

NOTES ON SPECIAL ANEURISMS.—*Aorta, Aneurism of.*—
Thoracic.—See medical works. Usually treated by rest and restricted diet (Tufnell's treatment).¹ Galvano-puncture and distal ligature (*i.e.* of the carotid) have both been employed beneficially.

Abdominal Aneurism.—May be either of aorta or of one of its branches. Diagnose from 'hysterical pulsation,' from pulsating cancer, and from abscess. In hysterical pulsation there are no true aneurismal bruit and no tendency to progress, but there are concomitant signs of nervous disorder. The other sources of error may be avoided by applying general principles, and watching a doubtful case for a short time. *Treatment* must generally be medical; but success has attended compression of abdominal aorta under anaesthesia for several hours (Murray, *Med.-Chir. Trans.*, vol. xlvi.). Directions for tying the iliac arteries will be found under *Arteries*. Loreta has also cured an abdominal aneurism by passing wire into the sac. (See *Brit. Med. Journ.*, April 11, 1885, and *Memoirs of Acad. Sci. Inst. Bologna*, Feb. 8, 1885.)

Axillary Aneurism.—Generally treated by ligature of subclavian (3rd part). Compression of subclavian. Operation of Antyllus recommended by Syme.

Carotid Aneurism.—Commonest seat—bifurcation of common carotid. When seated at root of neck, tie distally (Wardrop's and Brasdor's operation).

Femoral Aneurism.—Comparatively common, and admirably suited for treatment by compression. If ligature is resorted to for aneurism of common femoral, external iliac must be tied.

Gluteal Aneurism.—Usually traumatic, and singularly liable to be mistaken for abscess. Compression of the common iliac per rectum might be tried. Operation of Antyllus. Plug with iodoform guaze, if artery be difficult to secure.

Orbital Aneurism.—Usually arterio-venous aneurism, com-

¹ Good article on this by V. D. Harris, *St. Barth.'s Hosp. Rep.*, 1881.

mencing behind the orbit, especially in the cavernous sinus rather than in the orbit itself ; but very exceptionally 'cirsoid.' *Symptoms.*—Besides pulsation, there are displacement of the eyeball and sometimes loss of sight. *Treatment.*—Compress carotid digitally. Other treatment dangerous, but may be necessary. Ligature would have to be applied to the common carotid. Injection of the dilated veins with lactate of iron, comparatively safe as the blood-current in them is reversed. Often no absolute indication for treatment at all. Refer to Rivington, *Med.-Chir. Trans.*, vol. lviii.

Subclavian Aneurism.—Ligature of the innominate and of the first part of the subclavian artery have been always fatal, excepting in one case.¹ Therefore, subclavian aneurism is best adapted for the diet and rest treatment, or for galvano-puncture, or for manipulation. Amputation at the shoulder-joint is in some cases justifiable. Willett has suggested a combination of amputation at the shoulder-joint with ligature of the carotid.

Temporal Aneurism.—If superficial, always traumatic ; if deep, often arterio-venous aneurism.

Angeioma. *See* TUMOURS.

Animal Poison. *See* BITES ; HYDROPHOBIA.

Ankle, Amputation of, &c. *See* AMPUTATION, &c.

Ankle-Joint, Disease of.—Swelling causes prominence of and fluctuation beside extensor tendons. Diagnose from disease of tarsus. In the latter case there is free movement at the ankle under anæsthetics.² (See *Joints, Diseases of, and Excisions.*)

Ankylosis.—Three kinds : 1, *extra-articular* fibrous ; 2, *intra-articular* or ordinary *fibrous* or *false* ankylosis ; and 3, *bony* or *true* ankylosis. In the first case there are not, in the second there are, fibrous bands within the joint. First case results from inflammatory thickening of surrounding parts, contracted

¹ Smyth's. But antiseptic surgery, by rendering it possible to occlude the artery by a ligature, which has not to ulcerate its way through the vessel, has given new hopes for the future of this operation. See W. Thomson's (of Dublin) exhaustive and admirable paper in *Brit. Med. Journ.*, October 14, 1882. It is only fair to mention that in Thomson's all but successful case, Barwell's ox-aorta ligature was used.

² Good account in Owen's *Surgical Diseases of Children*.

ligaments and tendons, &c. Often there is a combination of all three. *Diagnosis*.—In osseous ankylosis there is no motion whatever ; in intra-articular fibrous (which is, comparatively, uncommon) there is some motion, which is checked more abruptly than in extra-articular. Anæsthetics may be required. *Causes*.—Joint-disease, &c. Osseous ankylosis usually caused by strumous or by traumatic disease.

Treatment.—1, Preventive : proper passive motion applied in time, is, of course, valuable ; but it is far more important to cure the prime disease, *e.g.* pulpy degeneration, in an early stage. Hence, probably, the greatest preventive of ankylosis is a perfectly fitting, rigid, plaster-of-Paris case. If ankylosis is inevitable, select the best position.

2. Curative.

Fibrous Ankylosis.—Passive motion, friction, douches, steam baths, screw splints, weights. Anæsthetics : subcutaneous rupture. Take a short hold (near the joint), and rupture by little successive jerks. Then apply ice. Tenotomy. Division of tight fascia. If necessary, divide either tendons or fasciæ through an open wound antiseptically.

Osseous Ankylosis.—Osseous ankylosis frequently demands interference to improve position. See ‘*Osteotomy*.’ Only in rare cases is it justifiable or worth while to try to get a movable joint—except in the case of the elbow. To simply divide or rupture, and then attempt to get a new movable joint by repeated passive motion, is a course which seems to me as astonishing and as unjustifiable as it is painful and unlikely to be successful. To practise passive motion after an osteotomy, or excision, with the skin-wound unhealed, and without strict antiseptic dressings, &c., is a piece of simple barbarism. The only rational way to get mobility, instead of an osseous ankylosis, is to convert it into a fibrous ankylosis by excising a segment of bone. A piece of proper size having been removed, it is not then necessary to hurry on to passive movements until the parts are fit to bear them.

Ano, Fistula in.—*Causes*.—It is the sinus left by an ischio-rectal abscess, *quod vide*. *Varieties and Signs*.—Complete and incomplete, former opens both inside and outside

anus ; blind internal and blind external. Sometimes there are several openings ; outer opening usually within one inch of anus ; granulation often projecting from it ; course of fistula feels hardened and thickened ; purulent discharge ; tenderness ; history of former abscess ; constitution often phthisical.

Prognosis.—Permanent cure difficult if the openings be numerous and phthisis co-existent. Ordinary cases easily remedied.

Treatment.—Introduce first a probe, then a director. Make blind fistula complete. Then slit up, on the director, the bridge of skin and sphincter covering fistula. Precede operation with a purge and an enema. Dress with iodoform, cotton-wool, and T-bandage. Check severe haemorrhage with styptics and pads. Galvanic cautery. Ligature. Elastic ligature. Co-existence of phthisis does not usually contraindicate operation. The anal fistula itself is frequently tubercular in origin. It then presents the same fungating, undermining appearances common to tubercular abscesses and fistulae elsewhere, and specially demands erosion and iodoform.

Anthrax.—A mycotic disease which, when affecting man, is usually termed '*Malignant Pustule.*' *Signs.*—A circumscribed, oedematous, inflammatory area of skin and subcutaneous tissue, with a gangrenous centre, usually situated on some part specially exposed to accidental inoculation, e.g. the face, and attacking persons who work among cattle or their hides. It is exceedingly dangerous. *Treatment.*—Absolute rest. A circle of hypodermic injections of corrosive sublimate in the healthy tissues around the disease. Up to 3*iv.* of Liq. hydrarg. perchlor. may thus be injected with impunity. Avoid the knife (?) ; prefer the cautery if you wish to attack the pustule itself.

Antiseptic Treatment, the.—Almost always means methods based on the germ theory, and having their origin in Listerism. *Principles* : 1, an open wound is more liable to complications than a subcutaneous wound, because germs may enter it and produce fermentation, resulting in irritation, decomposition, &c., which again lead to inflammation, blood-poisoning, &c., or the blood-poisoning may be direct through the entry and multiplication of the germs in the blood-vessels ; 2, certain

substances, *e.g.* carbolic acid, which destroy these germs should be employed systematically to prevent their access to wounds.¹ *Details* : those wherewith to conduct an ordinary Listerian operation or dressing are—spray, carbolised instruments and hands, carbolised catgut, protective next wound, gauze (usually eight folds), jaconet just beneath uppermost layer of gauze, also gauze-packing. Sometimes use a drainage-tube, then its end must be well concealed by gauze. Carbolised bandage, elastic bandage in certain cases, safety-pins. Mackintoshes are used temporarily to protect the patient from the spray. Wet carbolised towels to place around the site of operation. Trough of lotion for instruments. *Explanation of details* : spray (strength 1-20); carbolising the hands, &c., prevents access of live germs; protective protects from the irritating properties of carbolic acid: gauze absorbs and keeps the discharge aseptic; jaconet prevents discharge from soaking through to the surface and thus establishing a channel of infection. Lotion for asepticising instruments, &c. (strength 1-20). At least a quarter of an hour's immersion is required. But a third of that time or less suffices if a stiff brush and potash soap be used first. The hands, nails, &c., should *always* be so treated. Dressing should be removed under spray, and re-done from time to time, according to amount of discharge, which should not, if possible, be allowed to soak quite through. In absence of spray-producer douche the wound from time to time with lotion (1-40).² In cases of injury, thoroughly disinfect every part of the wound by syringing or rubbing with lotion (1-40 in recent cases, 1-20 in older), or Sol. zinc. chloridi (gr. xx.— $\frac{3}{4}$ j.) may be used. Antiseptic 'veil' and irrigation, substitutes for spray. Mayo Robson's dry vapour spray (*Brit. Med. Journ.*, September 1882). Boracic and salicylic acids, thymol, ol. eucalypti, iodoform, resorcin, cinnamic acid, boro-glyceride, bismuth,

¹ See *Microscopic Organisms and Wounds*.

² Matthew Hay describes a simple method of testing the strength of carbolic lotions in *Lancet*, August 7, 1886. If a cold saturated solution of common salt be added to 1-20 carbolic lotion, the mixture becomes milky and opalescent; if to 1-40 the mixture remains perfectly clear. Add the carbolic solution to the salt solution, not *vice versa*.

and mercuric bichloride have been used instead of carbolic acid. Strength of lotion for use in steam spray-producer, 1-20; steam dilutes it to 1-40. 'Boracic lint,' used as an antiseptic dressing for wounds which have nearly healed. Iodoform and bismuth are both of great value from their stability and comparative insolubility. The latter has also the admirable property of checking serous discharge, which carbolic acid tends to increase. Kocher has used it very extensively and successfully. The evidence in favour of boro-glyceride being a very valuable antiseptic for surgical purposes is, as yet, insufficient. Kummell has minutely worked out the details of corrosive-sublimate dressings.¹ Lister praises highly 'sero-sublimate gauze,' which is un-irritating, effective, and cheaper than carbolic gauze. Sublimate is certainly the most popular antiseptic at this moment, and of its intensely germicide properties there is no question.

It is beyond dispute the best antiseptic for drainage-tubes, sutures, the operator's hands, and the parts to be operated on. But carbolic should be used for instruments (which sublimate spoils the look of). It is no real objection to the sublimate douche that the tissues greatly weaken it by forming with it a mercuric albuminate. It is more important that the douche should be aseptic than antiseptic. It should be borne in mind, however, that, while 1-2,000 will disinfect river water, it requires 1-400 to disinfect putrid blood and the like. I greatly prefer the douche to the spray myself, on account of its convenience, and also because novices and nurses are apt to regard the spray as all-important, and to neglect such essentials as the purification of hands and instruments. In this habit they are encouraged and confirmed by the number of surgeons of all ranks and ages who trifle with antisepticism. These gentlemen corrupt every subordinate and double the difficulties of their more 'thorough' colleagues. Upon this particular question of spray or douche, they usually

¹ See *Arch. f. klin. Chir.*, B. xxviii., H. 3; *N. Y. Ann. of Anat. and Surg.* Aug. 1883.

think, with unconcealed glee, that to leave the former for the latter is a reversal, whereas it is simply an advance.

The 'salicylic silk' of McGill, of Leeds, makes an excellent 'packing.' So also would oakum and tenax, except that their antiseptic properties are not always reliable, and the tar in them may irritate the subjacent skin. The latter objection applies to the ordinary carbolic gauze.

Cotton-wool is extensively used, charged with one or other of the above-named antiseptics, especially salicylic acid.

Iodoform is very valuable for wounds about the mouth, nose, and anus. Gauze charged with it may be bought ready prepared. Or the powder may be dusted on and near the wound. It is soluble in ether and absolute alcohol, but not in water or serum. It may be had in two forms—either a fine powder, or small crystals. It has unfortunately a very peculiar odour. 'Iodoform collodion' and 'salicylic collodion' are effective antiseptic dressings for small wounds, especially if buried sutures are used at the same time. See *Wounds*. Iodol is said to be a valuable antiseptic.

Always the parts to be operated on should be cleaned and asepticised as much as possible before an operation is commenced. Soft soap, or still better, the liquid potash soap of Dr. Duncan of St. Petersburg, is preferable for the cleansing. When possible, this should be done a day or two before, and the parts dressed in the meantime with antiseptics. Duncan's soap can be obtained through M. R. Edwards, 6 Adam Street, Strand, w.c.

In the case of old sinuses, &c., mechanical means—*e.g.* scraping—as well as the injection of a solution of chloride of zinc, may be a necessary preliminary to antiseptic dressing. In these cases, again, iodoform is of great value.

Special points connected with antiseptic treatment are mentioned in various parts of this book. See also *Wounds*, *Gunshot Wounds*, and *Compound Fractures*.¹

¹ The chief special works on the antiseptic treatment are those of Watson Cheyne and MacCormac. The former has also published a small handbook.

Antiseptics, Poisoning by.

1. CARBOLIC ACID.—A number of cases have been described. For the most part they present the following symptoms : a rise of temperature ; vomiting ; loss of appetite ; pulse either slow or frequent or normal ; nervous symptoms, such as excitement or drowsiness, or even delirium ; urine dark-coloured, olive-greenish, and occasionally smelling of carbolic acid. Many of the cases are stated to have improved and relapsed exactly as the carbolic dressings were left off or resumed.

I believe it would be impossible for any unprejudiced person to read the details of these cases without becoming sceptical as to many, perhaps the majority. There is no proof, worthy of the name, that some were not septicaemia ; quite the contrary. It is clear also that others did *not*, as they are stated, date their improvement from the cessation of the carbolic dressings, but that the symptoms were previously subsiding. Some of the cases of 'idiosyncrasy' are too extraordinary to be credible without very strong proof, and they are stated with next to no proof at all. Lastly, I am certain that, under carbolic treatment, I have seen one or two similar sets of symptoms arise and disappear without any cessation of the carbolic, and that I have also seen them occur without the use of any antiseptic whatever.

But I do not doubt that it would be very easy to poison anyone by a persevering abuse of carbolic acid, by daily injecting and distending abscess-cavities and wounds with 1-40 lotion, or by continuing to apply carbolic dressings to surfaces from which its irritant properties have nearly removed the epidermis. And doubtless idiosyncrasy occasionally plays a part. I only protest against every obscure case of vomiting and high temperature with olive-green urine being put down to the acid, just as if carbolic acid in the urine was pathognomonic of poisoning ; or as if high temperature and nausea from nervous influences, from local discomfort and other more obscure causes, were unknown ; and as if even careful surgeons might not sometimes unwittingly leave a loophole for germs, in spite of 'the strictest antiseptic pre-

cautions' which are generally said to have been taken in these cases.

2. **IODOFORM.**—Cases of poisoning by this drug may be classified, according to their severity, into several degrees: (1) Mere temporary and not dangerous elevation of temperature, lasting a few days; (2) with or without fever, irritability, headache, anorexia, and rapid, frequent, small pulse; (3) dangerous disturbance of the circulatory and nervous systems—sudden increase in the frequency of the pulse, sleeplessness, delirium, hallucinations, or even 'general cerebral paralysis.' In these forms fatty degeneration of the heart, kidneys, and liver are found post mortem.

Debility and advanced age predispose to iodoform poisoning.

I confess to a thorough belief in the safety of this drug when used properly and reasonably. When we bear in mind that as much as ten ounces have been used at one dressing,¹ we cannot be surprised at occasional accidents.

Iodoform, with equal parts of bismuth trisnit. and zinc oxide, forms a good powder for dusting near wounds.

3. **MERCURIC CHLORIDE.**—*Symptoms.*—Chiefly diarrhoea: stools more or less blood-stained, gums swollen, perhaps ulcerated. *Prophylaxis.*—Wring out sponge well: do not deluge large cavities with the sublimate douche. Kummell thinks very anaemic persons and the subjects of renal disease should not be dressed with sublimate.

Antiseptic Surgery, How not to practise it.—Imbue yourself and your assistants thoroughly with the idea that the essential principle underlying it is merely perfect cleanliness as understood by the washerwoman. Speak of the spray as a troublesome plaything, the absurdity of which is now patent to Lister himself. Do not mention that the surgeons who first abandoned the spray use the douche as a substitute, and are still enthusiasts in antisepticism. Do nothing, in fact, which might mar one of your chief objects, which is to identify Listerism with the spray. Tell your pupils, as an important fact, that carbolic lotion was used before Lister's time. The great

¹ Mundy, quoted by Clark, *Glasg. Med. Journ.*, Aug. 1882.

surgeons of the past being now dead, you will not injure them if you state that cleanliness and rest are purely modern ideas, to which the decrease in surgical mortality is almost entirely due.

Having left all the preliminary steps of an operation entirely to others, having taken it for granted that the carbolic lotion is of the proper strength, that the douche or spray will work, that the instruments are clean, the sponges and ligatures aseptic, and the region to be operated on cleansed and asepticised, you will take up your knife and ask the anæsthetiser if the patient is ready. Upon receiving a negative answer, lay down the knife in any convenient place except the instrument trough, and wait a short time, which you can occupy in fingering, for instance, the putrid limb you are about to amputate. Having fairly commenced, you should succeed in gradually transferring most of your instruments from their trough to the operating table, patient's clothes, axillæ, and buttocks, assistants' button-holes, &c. Sponges should lie about anywhere and everywhere ; it is a good plan to occasionally drop them in the sawdust. Inexperienced and excited nurses may be trusted to occasionally change your sponges with those of the chloroformist. If the above directions are attended to, you will find it unnecessary to point out to everybody that one sudden and dainty dip in carbolic lotion suffices to render hands, instruments, &c., proof against septic infection for several hours, wherever they may be placed. The patient can materially assist in some cases if he is allowed to throw his hands about with perfect freedom. The extensive use of dry towels may prove invaluable.

The use of carbolic or sublimate lotion should be free, irregular, and thoughtless. The object is to get a maximum of its effects as an irritant, and then to give the germs a last fair and full chance before concluding the operation.

Arrange for drainage so that the discharge shall quickly appear at the edge of the dressings ; and don't waste time or thought in fixing the latter.

In the after-treatment, many of the above manœuvres may be repeated. Ignore pain, and never re-dress until the tem-

perature has gone up. Then syringe copiously with carbolic lotion.

The rules of drainage, or, indeed, any other principle or practice of sound surgery must not be applied in these cases. That would be to *favour* Listerism, not to give it a *fair* trial.

Finally, when your efforts have been crowned with success, attribute the results to carbolic acid poisoning, sneer at the germ theory, but say sententiously that 'whatever may be said, &c., all must acknowledge the deep indebtedness of modern surgery to Joseph Lister for having emphasised the value of cleanliness.'

The exact opposite of this method is to regard every surgical operation and dressing as a chemico-biological experiment demanding nicety, and extreme care.

Antrum, Diseases of, may be classified into Cystic Disease of, Suppuration in, and Tumours of Antrum.

ANTRUM, CYSTIC DISEASE OF.—Firstly, there is the form known as *Dropsey of the Antrum*, not owing to obstruction of antro-nasal orifice, but to cystic disease of the mucous membrane ; simple or multiple cysts ; bulging into nose, mouth, orbit, and cheek ; thinning of bone, even to crackling. Contents : thin, brownish, serous, with cholesterine. *Treatment.*—Catheterise through nose, or tap through anterior wall from mouth, or draw a diseased tooth and tap through its socket. Restore shape of cheek by pressure with a pad. A second variety, called '*Dentigerous Cysts*,' connected with malplaced teeth. Small ones common. Large ones cause absorption of neighbouring parts. *Treatment.*—Open and remove the contained teeth ; stuff cavity with iodoform gauze till it begins to granulate. If cyst be large, remove part of its wall.

ANTRUM, SUPPURATION OF.—*Causes.*—Carious teeth, blows. *Signs.*—Swelling, pain, puffiness of neighbouring soft parts : perhaps escape of pus or foetid discharge into nose. Projection of 'polypoid' granulations into nose. Abscesses may open through hard palate. The superficial appearances may be those of lachrymal fistula. *Treatment.*—Remove the

offending tooth and perforate through its socket, or extract second molar, or perforate canine fossa with a carpenter's gimlet. Wash out with antiseptic lotion. Keep a free exit for the pus. Restore symmetry by pressure. The antrum may have to be laid open through the cheek, and inspissated pus turned out of it by the nasal fossæ.¹

ANTRUM, TUMOURS OF, include, strictly, above-mentioned cysts : also fibrous, sarcomatous, osseous, cartilaginous, fatty, erectile, and carcinomatous (epithelial and encephaloid); fourth, fifth, and sixth kinds very rare. *Diagnosis* practically has only to be made between (1) simple and (2) malignant disease ; or between (1) malignant and within the antrum, and (2) malignant and extending beyond the antrum. If an operation is proposed, it should also be determined, if possible, where the tumour began, *e.g.* behind the antrum or not. In doubtful diagnosis from cysts, determine by perforation. *Malignant* tumours (1) grow rapidly, (2) early affect submaxillary glands, (3) protrude early into neighbouring cavities, forming a fungus. *Point of origin*.—Tumours of malar bone spread over upper jaw ; intra-antral tumours expand it on all sides ; post-antral tumours push it bodily forwards without distorting it. *Treatment*.—Operative or palliative. *Question of operation*.—If the soft structures of the cheek are not freely movable over the tumour, and if the glands are affected, do not operate ; nor if disease be malignant, advanced, and post-antral in origin. In simple disease remove no more of maxilla than the part diseased. For the operation, vide *Excision of Upper Jaw*.

Anus, Artificial.—See *Colotomy* and *Hernia*.

ANUS, CANCER OF, usually spreads from rectum. If primary, commonly epithelioma. Excise. See *Rectum, Cancer of*.

ANUS, FISSURE OF, usually accompanied by **ANAL ULCER**. *Causes*.—Female sex : Debility, cachexia, dirty habits, eczema. *Signs*.—Burning pain after defæcation, sometimes lasting for hours ; seat of pain, chiefly sacro-iliac articulation ; genito

¹ See W. Thomson, *Dublin Journ.*, July, 1882.

urinary irritation ; purulent, bloody and mucous exudation ; patient feels and looks worn and despondent ; on examining anus carefully (a speculum may be required), one or more small ulcers or fissures seen, generally very tender ; sphincter very irritable and spasmoidic ; ulcer usually near coccyx and just within anus. *Treatment.*—Cleanliness ; hot water ; iodoform ; zinc ointment ; vaseline ; nitrate of silver ; anodyne and astringent suppositories ; division of ulcer or fissure and superficial fibres of sphincter to depth of one-eighth of an inch. Rest in bed for some time after operation.

ANUS, FISTULA. See *Ano, Fistula in.*

ANUS, IMPERFORATE (including congenitally malformed rectum).—Six kinds.¹ Case 1. Congenital narrowness of anus. *Treatment.*—Notch and introduce sponge-tents. Case 2. Complete closure of anus ; rectum normal. *Treatment.*—Crucial incision ; no plug required. Case 3. Closure of rectum by a membranous septum : anus normal. *Treatment.*—Pass an ear-speculum up to the septum ; pass a tenotomy-knife through speculum, and, cutting in the median line, with an inclination *towards the sacrum*, divide the septum. Case 4. Complete absence of anus. Case 5. Absence of a considerable part of the rectum ; often a fibrinous cord instead. *Treatment.*—In cases 4 and 5 an attempt may be made to dissect up to the rectum as follows :—*Operation.*—Keep in mind small size of pelvis and relations of bladder and internal iliac vessels ; empty bladder : incise exactly in the position of the anal depression ; crucial incision ; cut beyond the posterior margin of the depression ; cut deeply with first incision ; introduce finger with the point upwards and backwards. Generally the cul-de-sac of the bowel can be felt when the child cries, or when the abdomen is pressed upon by the assistant. Puncture upwards and backwards ; enlarge with probe-pointed bistoury ; bring mucous membrane of gut down to external wound if possible ; keep open at first with a suppository. If the operation fails, never plunge a sharp instru-

¹ For illustrative diagrams, see Spence's *Surgery*, and also *Liverpool Medico-Chi. Journ.*, July 1883. The latter (by Rushton Parker) refers to some curious instances of nature's modes of compensating for absence of anus, and even of both anus and urethra. Also Cripps, *S. B. H. Reps.*, 1882.

ment blindly into the pelvis ; but perform Littré's operation of inguinal colotomy (vide *Colotomy*). Case 6. Rectum may communicate with or open into vagina, bladder, or urethra. *Treatment* for case 6.—Plastic operation ; operation for artificial anus ; or nil. Colotomy sometimes causes a mere communication to close up, and all the faeces to pass per anum.

ANI, PROLAPSUS, is really a prolapse of rectum, usually of its mucous coat only. *Causes*.—Constitutional weakness. Rectal, genital, and urinary irritation causing straining. The bad custom of placing a child upon the chamber-utensil, and leaving it there for an indefinite period (Allingham). Piles, polypi, urinary calculi, worms, phimosis, constipation. *Age* of childhood. *Signs*.—Protrusion of a ring of mucous membrane, becoming dark and turgid if allowed to remain prolapsed. Strangulation, suppuration, and even mortification may occur. *Treatment*.—Reduce prolapse at once. Regulate bowels ; mild aperients, Friedrichshall water, 'effervescing citrate of magnesia.' Recumbent position after, or even during defæcation. Astringent injections, alum, tannin, iron, cold water frequently and freely. Tonics, iron, strychnia. Always seek for and remove cause. In bad cases, ligature parts of the prolapsus, or paint it with strong nitric acid, bathing afterwards in cold water. Van Buren's cautery operation. (See Allingham on 'Rectal Diseases,' p. 169.) Incise freely a strangulated prolapsus. Children should have one buttock pulled to one side obliquely during defæcation : this causes a tight fold of skin to support anus.

Aorta, Abdominal. *See ARTERIES.*

Aorta, Ligature of. *See ARTERIES.*

Arteries, Atheroma of.—Term applied to the effect produced on arteries by a chronic or sub-acute inflammation. *Causes*.—In many cases, unknown. Alcohol, syphilis. Common in advanced age. Atheroma is common where an artery pulsates against a bony surface (A. Barker). *Signs*.—During life such arteries as the radial and temporal are often found hardened and even looped. Liability to aneurisms and rupture of the arteries. *Pathology*.—Begins by a deposit of

cells in the inner, where it joins the middle coat. This inflammatory new formation takes one of three courses. Either (1) it softens down into molecules and fat, and causes an ulceration of the tunica intima ; or (2) it organises into a fibrous thickening ; or (3) it undergoes a calcareous degeneration. It is in the first case that aneurism is most likely to occur. In the smaller vessels it is the muscles which ossify. When the disease attains a high grade, the arteries bulge out ; various stages found together at same time. In the smallest arteries the process affects chiefly the adventitia. In the largest arteries (which are almost void of muscle) it affects almost entirely the intima. Atheroma pulp consists of molecular and fat granules, cholesterine, crumbs of carbonate of lime, and haematoxin crystals. *Effects of Atheroma.*—Secondary haemorrhage. (Acupressure, chromic gut, or the ox-aorta ligature,¹ recommended for atheromatous arteries.) Gangrene.

Aneurism.

Arteries, Ligature of.—Arteries are tied either in the continuity or at a point wounded or severed. 1. *Ligature in the continuity.*—Operation generally done at a point selected, because, 1, it is not too near a diseased part of the vessel (e.g. an aneurism) ; 2, it is not so far off an aneurism that collateral circulation would at once nullify the operation ; 3, it is not close to the origin of a large branch, the rush of blood through which would prevent coagulation and cause secondary haemorrhage. *Operation.*—Learn well the superficial and deep landmarks, and the anatomy of the part. Mark out the vessel's course. Incise the skin and superficial fascia equally and sufficiently. A director may be used for the deep fascia. Avoid superficial veins ; avoid opening sheaths of muscles. 'The surgeon should not at the commencement occupy himself with looking for the artery, but should seek the first marked point of guidance, then the second, then the third, and so on to the end' (Bryant). Handle of knife will push muscles, &c., aside. Retractors. Feel artery pulsate. Opening in sheath to be small, and made with knife-blade held on a plane just

¹ These should be tied gently, so as not to divide the inner coats.

superficial to the artery, that is, 'on the flat.' Insinuate aneurism-needle round artery. Draw out ligature with forceps. In tying, press down knot with tips of forefingers ; do not lift vessel from its bed. Cut one end of a silk ligature short, and both ends of a catgut or other absorbable one. Close wound, and dress. Before actually tying ligature, make sure that you have surrounded the artery, the whole artery, and nothing but the artery. Needle should be passed between the artery and its vein. *Process of repair, &c.*—The two inner coats are divided by the ligature, and retract a little. A clot forms up to the nearest branch. Lymph is effused round the ligature. In the most favourable cases, the lymph and the clot organise ; and the cut arterial coats grow together, so that when the outermost coat is ulcerated through, a new barrier has been formed against haemorrhage. But these processes may wholly or partially fail. Then there is more or less danger of secondary haemorrhage. To avoid this risk, the practice of tying very gently, but with a strong knot, chromic gut, ox-aorta strips, or kangaroo-tail tendons, has been devised, and followed successfully. At St. Bartholomew's Hospital, the old method of dividing the artery between two ligatures has been revived. The arguments for and against this plan were (Midsummer, 1883) urged in the *British Medical Journal* by Messrs. Walsham and Holmes respectively. *Dangers.*—Secondary haemorrhage from ulceration, from ligature slipping or softening, or from suppuration. Gangrene, from non-establishment of collateral circulation, from injury to, and consequent coagulation in, the vein, or from suppuration of an aneurismal sac. Erysipelas and other accidents to which all wounds are liable. 2. *Ligature of an artery open in a wound.*—Be careful not to include neighbouring nerve. Reef-knot. Asepticised silk, and catgut ligatures.

When a large artery has been tied, care must be taken to keep warm the parts normally supplied by it.

LIGATURE OF SPECIAL ARTERIES.—*Abdominal Aorta.*—1st method : incise the abdominal wall as in ovariotomy. Divide the peritoneum covering the aorta and pass the ligature. 2nd

method : make an incision like that for ligature of common iliac, and proceed as if for ligature of that vessel, but keep a little higher. Doubtful whether operation is ever justifiable. For details, *vide* larger works.

Axillary.—Very rarely tied. Line of artery. From just internal to coracoid process, curving outwards and downwards to commencement of brachial artery. Divide skin and pectoralis major. Beware of vein and brachial plexus.

Brachial.—In middle of upper arm. Line of incision, inner edge of biceps. Avoid basilic vein and internal cutaneous nerve ; open deep fascia ; look out for median nerve ; artery usually lies just beneath it, but may be superficial to it. Remember occasional high division of brachial.

Carotid, Common.—Position : head back, face turned away at first. Place of selection—just above omo-hyoid (*i.e.* level of cricoid cartilage). Line of artery, sterno-clavicular articulation to midway between mastoid process and angle of jaw ; incise skin along anterior border of sterno-mastoid three inches ; platysma ; deep fascia. Raise head, relax and retract sterno-mastoid ; look for omo-hyoid ; carotid sheath with descendens noni. Open sheath well to inner side. As a rule jugular vein and vagus nerve not seen. 2. In tying artery low down, divide partially sterno-mastoid, sterno-hyoid, and sterno-thyroids. *Fatality*.—When operation is for haemorrhage, 56 per cent. have died. When for aneurism, on Brasdor's method, only one in four. For affections of the nervous system, only one in thirty-four. *Chief Dangers*.—Brain symptoms and secondary haemorrhage.

Carotid, External and Internal.—Ligation of common carotid preferred. For external carotid proceed as follows : line of incision same as for common carotid ; incision from angle of jaw to middle of thyroid cartilage ; freely incise any glands which may be in the way ; tie and divide cutaneous veins ; look for hypoglossal nerve ; tie artery between origin of superior thyroid and lingual arteries.

Femoral.—The *common femoral* rarely tied (ligature of external iliac preferred). Incise in line of artery ; crural branch of genito-crural nerve ; open sheath ; tie about one

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inch below Poupart's ligament ; pass needle from within outwards.

Superficial Femoral tied in two places : 1. In apex of Scarpa's triangle. Position : abduction and rotation outwards : knee flexed ; line of artery, from middle of Poupart's ligament to front of inner condyle ; incise skin 3-4 inches at junction of upper and middle thirds of thigh ; divide fat ; avoid saphena vein ; divide fascia lata well to inner side of sartorius, so as not to open sheath of that muscle ; retract sartorius outwards ; feel for sheath of artery ; branch of ant. crural over sheath ; open sheath ; clear artery with point of director ; pass needle from inner side. 2. In Hunter's canal. Done when operation in Scarpa's triangle fails. If done at lower end of Hunter's canal, draw sartorius to inner side ; incision in same line as when artery is tied in Scarpa's triangle, but longer, and of course lower down thigh. Other steps similar to first operation.

Iliac, Common.—Line of artery : from half-inch to left of umbilicus to middle of Poupart's ligament. Incision, from end of last rib downwards and forwards to crista ilii, and then forwards above and parallel to crest of ilium as far as anterior superior spine ; divide muscles and transversalis fascia, using finger as a director ; roll up peritoneum and intestines out of way, and tie artery. Second method : incise skin first from outside internal abdominal ring, parallel to Poupart's ligament, three or four inches towards ant. sup. spine of ilium ; then continue incision with a curve inwards towards umbilicus, and proceed with muscles and transversalis fascia much as in first method. Remember relation to veins, ureter, and spermatic vessels. *Fatality*.—Very great—twenty-five in thirty-two ! Chief causes : exhaustion and haemorrhage.

Iliac, External.—Line of artery same as common iliac. Incise skin half an inch above Poupart's ligament from just external to internal abdominal ring outwards in a curve three inches long, and parallel to the ligament ; divide muscles and transversalis fascia carefully ; push up peritoneum ; separate artery from vein ; pass needle from within outwards : the higher up the artery is to be tied, the farther must the outer

end of the incision be extended upwards and inwards, the incision thus becoming like that for the common iliac. Beware of seven dangers : 1, wound of epigastric artery ; 2, wound of spermatic cord ; 3, laceration of peritoneum ; 4, puncture of external iliac vein ; 5, of circumflexa ilii vein ; 6, ligature of genito-crural ; 7, too free disturbance of sub-peritoneal cellular tissue. *Fatality*.—One in three. Chief causes : gangrene, haemorrhage, and peritonitis.

Iliac, Internal.—Steps of operation as for common iliac. Trace internal iliac from bifurcation of common iliac ; scratch artery clean with finger-nail and director ; pass ligature three-quarters of an inch from origin. Beware of ureter, vein, and peritoneum. *Fatality*.—One in two.

Innominate.—Incision, along anterior border and sternal end of sterno-mastoid ; divide as much of sterno-mastoid as may be necessary to expose carotid, and trace carotid downwards to innominate. *Fatality*.—Only one case has completely recovered. In it the carotid and vertebral were also ligatured (Smyth's case).¹

In order to tie the innominate, or the first part of the left carotid or subclavian, Prof. Bardenheuer resects subperiosteally the upper part of the sternum.

Lingual.—Line of artery : just above greater cornu of hyoid bone ; incision horizontal, with centre opposite end of greater cornu of hyoid bone ; look for hypoglossal nerve ; artery crosses beneath it ; divide hyo-glossus muscle from hyoid bone ; artery is thus exposed. Beware of mistaking ranine vein for artery. *Object*.—Usually to check haemorrhage from cancer of tongue or during excision of that organ.

Middle Meningeal.—When the exact point of injury is uncertain, the artery should be uncovered, $1\frac{1}{2}$ inches behind the external angular process of the frontal bone, and 1 inch above the zygoma. A large trephine will here expose both large ascending branches.²

Radial.—Line of artery : from inner side of biceps tendon

¹ See note to *Subclavian Aneurism*, p. 26.

² Elaborate memoir on this in *Deutsche Zeitschr. f. Chir.* Bd. 21 & 22, by Wiesman. Abstract by Van Arsdale in *Ann. of Surg.*, Dec. 1885. See also Jacobson, *Guy's Hosp. Rep.* 1886.

at bend of elbow to half an inch internal to styloid process of radius. Ligature in *upper third* : incision in line of artery. Separate supinator longus from pronator teres, and tie. *Lower third* : divide skin and deep fascia to outer side of flexor carpi radialis.

Subclavian.—Tied only in third part of its course. Raise patient on a pillow, head back, face turned away, arm pulled down ; incise a long clavicle, pulling skin down over it ; divide border of sterno-mastoid if necessary ; deep fascia ; retract external jugular ; separate vessels and cellular tissues beneath deep fascia without using knife-blade ; feel for scalene tubercle and scalenus anticus. Subclavian lies behind them ; brachial plexus and subclavian vein : pass needle from below upwards. *Fatality*.—Nearly one in two. Chief causes : haemorrhage, gangrene, intrathoracic inflammation, ‘sloughing or suppuration of aneurism.’

Tibial, Anterior.—Line of artery : from head of fibula to midway between two malleoli. *Upper or middle third* : divide skin in line of vessel, look for a white line in deep fascia, marking out border of tibialis anticus ; divide the line and separate tibialis anticus from ext. long. dig. above, and from extensor pro. poll. below : nerve superficial ; patient should put tibialis anticus into action before anaesthesia. *Lower third* : artery nearly superficial.

Tibial, Posterior.—*Upper half* : two methods—1 (Guthrie’s), perpendicular incision, six inches long, through middle of gastrocnemius, soleus and deep (submuscular) fascia ; artery lies on tibialis posticus : nerve crossing superficially and obliquely from within outwards. 2nd method : incision, three-quarters of an inch behind and parallel to posterior border of tibia, down to tibial origin of soleus. Separate soleus from bone, divide sub-muscular fascia, and find artery immediately beneath it.

Near Ankle.—Artery lies beneath thick deep fascia, rather nearer malleolus than heel. Incise over it.

Ulnar.—Line : from middle of bend of elbow, curving inwards slightly, to outer side of pisiform bone. *Upper half* : incise obliquely over course of vessel and well to inner side of

arm : find outer border of flex. carpi ulnaris : divide it from flex. sublimis, and find artery between superficial and deep flexors ; inner border of flexor sublimis may be found in thin people by putting that muscle in action.

Above Wrist.—Divide skin and deep fascia just to outer side of tendon of flex. carpi ulnaris. Nerve on the inner side.

Vertebral.—Done for epilepsy, by W. Alexander, of Liverpool. For details see *Med. Times and Gazette*, Nov. 19, 1881.

Arthritis Deformans. *See RHEUMATIC ARTHRITIS, CHRONIC.*

Asphyxia.—*Causes.*—1, Compression of chest ; 2, compression of lungs by air in pleura ; 3, traumatic compression of trachea, as in garroting ; 4, foreign body in air-passages ; 5, immersion in some fluid, including (a) water (drowning), (b) some inert gas, (c) some poisonous gas ; 6, disease, including (a) pressure by aneurism, œdema glottidis, accumulation of mucus, &c., (b) paralysis of respiratory muscles. Hanging may be classed with cause 3. *Appearances.*—Lividity, swelling of face, perhaps bleeding from nose or mouth. Post mortem : engorgement of right side of heart, emptiness of left side of heart ; arteries contain venous blood ; abdominal viscera engorged : lungs not peculiar when there has only been mechanical obstruction ; but in drowning they are filled with frothy water, doughy and heavy, and the air-tubes are choked with frothy and bloody water and mucus. Brain sometimes hyperæmic, especially after hanging or suffocation. *Prognosis.*—Almost hopeless after five minutes' submersion. Remember a person may be immersed some time without being *submerged*. Recovery has taken place after three-quarters of an hour of asphyxia (Weeks), and longer, I have heard, in a case of Pirogoff's. Prognosis much worse if water has got into the lungs.

Treatment.—In drowning hold the patient's head downwards for a few seconds to begin with. In hanging or choking, bleed from jugular. If there is obstruction to passage of air through mouth and nose, open trachea. Then friction, warmth, warm bath (100°), ammonia to nostrils ; but begin at once artificial respiration, and continue it. Artificial respiration by : 1, inflation from mouth to mouth ; 2, bellows ; 3, split sheet ;

4, Marshall Hall's method ; 5, Sylvester's ; 6, Howard's ; 7, inhalation of oxygen ; 8, galvanising phrenic nerve. With bellows, 15 cubic inches should be introduced 12 times a minute. Oxygen was successfully administered after three-quarters of an hour's asphyxia in Weeks's case.

Sylvester's method.—Lay body on back, on a plane inclined slightly towards feet ; cushion under head ; head in line with trunk ; tongue drawn forward ; grasp arms just above elbows and draw upwards till they nearly meet above head ; there retain them for two seconds ; then depress them again and press them firmly for two seconds against the sides, combined, if possible, with pressure on lower part of sternum ; repeat about fifteen times per minute. Remember, artificial respiration is the first thing to be attended to ; warmth and friction are secondary ; the endeavours should be kept up for at least three or four hours, even without any encouraging signs.

In *Hanging*, besides asphyxia, there is usually some apoplexy, as well as injury to the spinal cord.

Howard's method.—Body on back ; cushion of clothes beneath thorax ; head bent back as far as possible ; hands above head.

Operator kneels astride of patient's hips ; hands on thorax, near edge of costal cartilages ; thumbs near xiphoid ; elbows against your own hips.

Action.—Throw forward your weight upon patient's thorax, using your knee as a pivot. Press upwards for two or three seconds, then relax and rest three seconds. Repeat ten times a minute.

Aspiration.—The aspirator is an exhausting syringe, used for drawing off fluids without admitting ingress of air, and in exploring for purposes of diagnosis. The needle should be pressed in with a screwing motion, and the taps should be managed carefully and without hurry. Mischief has resulted from the use of needles not thoroughly cleansed and aseptic.

Atheroma. *Vide ARTERIES, ATHEROMA OF.*

Atheromatous Tumours. *Vide TUMOURS (CYSTS).*

Atlas, Disease of. *See SPINE, CAVITIES OF.*

Atlas, Dislocation of. *See DISLOCATIONS.*

Atrophy may be natural or pathological. Natural atrophies are such as the general wasting of advanced age and certain local wastings like those of the thymus in infancy and the womb after childbirth. *Causes.*—For those of the natural atrophies, see works on PHYSIOLOGY. Pathological atrophies are mostly caused by diminished blood-supply. This may result from disease, from general malnutrition, or from some limited mechanical influence such as a ligature, or an embolus obstructing a nutrient artery. Direct pressure is a common cause. It acts most certainly when continuous. Pressure sometimes acts interstitially, e.g. when inflammatory fibroid tissues shrink and destroy cellular elements (as in cirrhosis of liver). When the points of attachment of a muscle or of any soft structure are kept permanently approached towards each other, the intervening structures atrophy longitudinally. Atrophy is frequently associated with fatty degeneration, and the growth of fat may be so great as to give a false appearance of hypertrophy. The cause of many atrophies is quite obscure. Sometimes they are associated with inflammations of neighbouring parts or with impaired nerve-supply. Often, in a case of wasting, the phenomena are partly explicable in a simple manner and partly not so. *E.g.* the great wasting of the bones in some limbs stricken with infantile paralysis is partly, but only partly, due to disuse.

Diagnosis and Treatment.—See local sections.

Axis, Disease of. See SPINE, CAVITIES OF.

Back, Sprains of.—Usually occur in neck or loins, often affect intervertebral ligaments; tumefaction, rarely ecchymosis, stiffness, tenderness; in severe cases, patient lies on his side, semi-flexed; haematuria when the kidneys are hurt; occasionally symptoms of paralysis; if such persist, intervertebral haemorrhage, inflammation of the meninges, or injury to the cord are indicated. *Causes.*—Falls on head or buttocks, railway collisions, &c. *Diagnosis.*—From fracture or dislocation, line of spinous processes straight; tenderness more or less diffuse; patient can probably, though with pain, raise himself into the erect position, straightening his spine. *Prognosis.*—Good, even when there is haematuria; even severe

paralysis sometimes passes off in a day or two, but danger of inflammation spreading to meninges of cord. This danger is greatest in atlanto-axial region. *See SPINAL MENINGITIS, FRACTURE, HÆMORRHAGE, &c.* *Treatment.*—Rest. *See SPRAINS.*—Actual cautery and Corrigan's Button or Sayre's Jacket in obstinate cases.

Bacteria. *See MICRO-ORGANISMS.*

Balanitis.—Inflammation of glans penis or lining membrane of prepuce. *Causes.*—Gonorrhœa, phimosis, dirty habits, ill-health. *Treatment.*—Zinc ointment, astringent lotions, nitrate of silver. A chancre may co-exist.

Barbadoes Leg. *See ELEPHANTIASIS ARABUM.*

Battey's Operation. *See APPENDIX ON UTERINE DISEASES, &c.*

Bed-sores attack the skin over hard prominences, e.g. sacrum, ischial tuberosities, trochanters, condyles of knees, elbows, and heels. First the skin reddens, then an abrasion may form, then a slough ; in bad cases even spinal canal may be opened, sometimes serious hæmorrhage. *Causes.*—Pre-disposing are debility, emaciation, continued fevers, especially typhoid, paralysis, old age ; exciting causes are continued pressure, irritation of faeces and urine, the under sheet and night-shirt not being kept smooth, &c. *Prognosis.*—Depends chiefly upon whether the cause can be removed or not. *Treatment.*—Preventive measures are good nursing, dry, smooth draw-sheets, water beds or cushions, frequent change of position. The buttocks, &c., should be rubbed twice a day for five minutes with camphorated spirit, or with a mixture of olive oil and brandy (equal parts) ; or bathe the part with hydrarg. perchlor. in sp. vin. rect. (gr. ij.- $\frac{3}{4}$ j.) ; prominences should be covered with amadou plaster ; when an abrasion forms, apply iodoform collodion and try to take off the pressure ; when a slough is forming, use iodoform and balsam of Peru on cotton-wool. Prone position sometimes necessary.

Bees, Stings of.—*Treatment.*—Rubbing with olive oil, strong liquor ammoniæ, indigo, eau de Cologne, vinegar, flour, &c. ; remove the sting if it can be found; ice.

Biceps Humeri, Division of Tendon of.—Insert knife on

inner side, pass it beneath the tendon, and cut outwards and towards the skin ; press brachial artery away during operation.

Biceps Femoris.—In dividing this, pass tenotome in parallel to, and keep it close to the tendon. Try to press the tendon outwards away from the peroneal nerve with the left thumb.

Bites of Poisonous Snakes.—*Symptoms.*—Local, are rapid swelling, redness, lividity, phlyctenulae filled with sanguous fluid ; swelling spreads, whole body assumes a jaundiced hue ; resemblance to ordinary phlegmonous erysipelas ; but ‘the first symptom, in nearly all cases, appears to be a general shock to the nervous system’—faintness, tremor, great depression, sometimes stupor, loss of sight, vomiting, trismus, and general insensibility ; great local pain. *Pathology.*—First effect is a shock to the nervous system ; second, is a diffuse cellulitis, spreading from the wound. *Prognosis.*—Depends on relative size of snake and victim, on situation of wound (worst when on face or trunk), and, of course, on kind of snake.—See G. Busk in Holmes’s *System*. *Treatment.*—Ligation above part bitten ; sucking wound ; caustics, actual cautery ; excision ; injection of wound with ammonia or carbolic acid, or potass. permang. 2-3 ccm. of a 1 per cent. solution (Lacerda) ; injection of ammonia into the veins (Halford) ; liq. ammon. fort. mx ., ad aquæ mxx ., to be injected into a large vein near the wound ; rubbing with olive oil ; liq. potassæ internally and externally.¹ The strength must be kept up with milk, eggs, wine, soups, &c. ; the spirits must be cheered.

Bites of Rabid Animals. See HYDROPHOBIA.

Bladder, Atony of, arises from muscular weakness of old age, or after fevers, or paralysis, or from continued obstruction by enlarged prostate or organic stricture. It must not be confounded with actual paralysis. *Symptoms.*—Retention, or else incontinence of urine, caused by the overflow of the bladder. *Treatment.*—Catheterism twice a day ; cold douche and frictions to lumbar spine, and injections of cold water. Electricity. Sometimes strychnine when a spinal affection

¹ See J. Shortt, *Lancet*, May 6, 1882.

seems to be the cause. *Prognosis*.—Depends upon curability of the cause and upon duration of the disease.

BLADDER, CANCER OF.—Epithelioma is very rare, and slow in its progress. Scirrhous is most rare, except as an extension from neighbouring organs. Encephaloid is more common. *Symptoms*.—Frequent and difficult micturition: pain in neck of bladder, often extending to loins and hips as well as perineum; haemorrhage usually sudden and copious; frequent and continuous oozings are more characteristic of villous growth (Thompson); enlargement of pelvic and lumbar glands; sometimes microscopic fragments of cancer are found in urine; growth may be felt per rectum or by catheter; cachexy. *Treatment*.—Attend to general health, state of bowels, appetite, &c. Use anodynes, especially subcutaneous morphia injections, with no niggard hand; morphia suppositories; alcoholic stimulants. For the haemorrhage, cold, rest, ergot, and injections, silver nitrate, gr. ss. to $\frac{3}{4}$ j., iron, and other local astringents. Recumbent posture in some cases. Some tumours in the bladder are accessible for operation. See *Bladder, Digital Exploration of*.

BLADDER, CATARRH OF.—Chronic inflammation with mucopurulent secretion. *Causes*.—Generally either stricture, calculus, or enlarged prostate; often paralysis; atony, ulceration, tumours, cancer; a sequel of acute cystitis; may arise from disease of neighbouring parts, anus, rectum, vagina, and uterus; gout, gonorrhœa, foreign bodies, and, in fact, any irritant which can affect the bladder. *Symptoms*.—Frequent micturition; urine, ammoniacal, fetid, mixed with stringy mucus, deposits phosphates; the general health gradually gives way; pain, generally dull and radiating along perineum, anus, urethra, &c. *Pathology*.—The mucous membrane is thickened and congested, and the subjacent muscular tissue hypertrophied. *Prognosis*.—Recovery may take place in recent cases, but old cases generally die eventually, worn out, or else in a typhoid state. *Treatment*.—1. Local. wash out bladder with solutions of acetate of lead ($\frac{1}{6}$ gr. to 1 oz.), argent. nitrat. ($\frac{1}{8}$ gr. to 1 oz.), or nitric acid ($m\frac{1}{2}$ to $\frac{3}{4}$ j.); the strength may be gradually increased. P. P. White, of Dublin, uses 4 gr. borax to 8 oz.

of 'very hot water.' When the urine is foetid, carbolic acid (m.j. to 3*iv.*). Manipulate very gently, and inject only 2 or 3 oz. at a time. Counter-irritation: croton oil or iodine to pubes; linseed and mustard poultices to pubes. 2. Internal remedies: Anodynes by mouth and rectum. Aperients. Buchu, *uva ursi*, *pareira brava*, *triticum repens*, *kakakava*, *ol. santalini*, iron. Dr. Gross strongly recommends *copaiba* and *cubeb*s when the secretion is excessive. Demulcents: decoctions of marsh-mallow, linseed, Irish moss, elm bark, or barley. The urine should be made neutral if acid. Diet is very important: light, nutritious, farinaceous. Milk and fish. Rest horizontally; warm clothing; warm climates. In severe cases the median lithotomy incision may be made.

BLADDER, DIGITAL EXPLORATION OF.—Valuable in obscure cases. Make a median incision in the perineum, opening the bulbous part of the urethra. Straight staff. Press left forefinger into urethra, and press with right hand above the pubes. Almost every part of the empty bladder can be thus examined, unless the patient is very fat.

BLADDER, DILATATION OF, without hypertrophy, sometimes exists.

BLADDER, EXTROVERSION OF.—A congenital malformation in which the anterior wall of the bladder and the adjacent part of the abdominal wall are absent. More common in males than in females. *Symptoms.*—The red mucous membrane of the posterior wall of the bladder presents in the pubic region as a flattened tumour, on which the orifices of the ureters may be found; umbilicus absent; epispadias; urine always dribbling; consequent excoriations and urinous odour; impotence in the male. *Treatment.*—Zinc ointment for excoriations; urinals carefully fitted to the case. Radical cure. Skin-flaps are turned down from the neighbouring parts—groins, scrotum, &c.—and united so that one surface of skin turns towards bladder, the other outwards.

BLADDER, FOREIGN BODIES IN.—*Treatment.*—Urethral forceps, lithotrite, operation as for median lithotomy.

BLADDER, HYPERSTROPHY OF, arises from obstruction to the passage of urine, and from continued irritation. Com-

monly co-exists with catarrh. Its existence can be inferred from that of its causes. Anterior wall much more thickened than posterior (Hurry Fenwick). *Treat the catarrh and remove the causes.*

BLADDER, INFLAMMATION (ACUTE) OF, usually affects trigone. *Causes.*—Predisposing are male sex, adult age, cold weather and season, intemperate habits, urinary obstruction. Common exciting causes are wounds, *e.g.* lithotomy ; calculi, intemperance, stricture, gonorrhœa, injury during parturition, protracted retention. Other causes are blows on perinæum or hypogastrium, stimulant diuretics, *e.g.* cantharides ; blisters, catheterism, lithotrity. *Symptoms.*—Pain locally, affecting perinæum, pubes, groins, sacrum, thighs ; extreme irritability of bladder ; urine voided spasmodically as soon as it enters bladder. In severe cases, such as those which may follow lithotomy, there are rigors, often delirium, extreme local tenderness and great danger. In milder cases, such as often result from gonorrhœa, the symptoms are chiefly local. Urine deposits mucus and pus ; in severe cases it is bloody. *Pathology.*—Usually commences at, and is often confined to neck of bladder ; mainly affects mucous membrane ; this is thickened and congested ; in protracted cases it gets dark in colour. Occasionally lymph is exuded so as to form false membrane. *Prognosis.*—The mild form yields to treatment. The virulent form, especially in shattered constitutions, is often fatal, death being sometimes preceded by gangrene. *Treatment.*—Cathartics : castor oil, black draught, or calomel ; diaphoretics ; demulcent drinks flavoured with a little lemon-juice ; all drinks to be tepid ; opiate suppositories and enemata ; colchicum in gouty cases. Hot baths ; linseed and mustard poultices to the abdomen and perinæum ; fomentations ; leeches (five, ten, or more) to the perinæum and margin of anus. Cupping the loins when there is pain in that region. Retention should be watched for and may require catheterism. Painting hypogastrium and perinæum with T. iodi.

BLADDER, INVERSION OF.—Four cases have been recorded. Occurs in female children only.

BLADDER, IRRITABILITY OF THE, always a symptom only,

though its importance has given it the rank of a disease.

Causes.—1, disease of the urinary apparatus : vesical catarrh, stricture, prostatic disease, foreign body, tumour or calculus in bladder, disease of kidney or ureter, gonorrhœa ; 2, state of urine, most common in elderly males ; 3, diuretics, cantharides ; 4, venereal excesses, onanism, a long and narrow prepuce ; 5, indigestion, ascarides, haemorrhoids, fistulæ, prolapsus ani, pruritus ani ; 6, nervous disorders, hysteria, depressing emotions, excessive mental exertion ; 7, debility from any cause ; 8, exposure to cold ; 9, ovarian and uterine diseases. *Symptoms.*

—Frequent micturition, but the total amount of urine passed not excessive. *Prognosis.*—Good, when the cause can be removed. *Treatment.*—Remove the cause if possible ; at all events treat it. Ext. belladonnæ, gr. one-sixth per diem ; copaiba ; tinct. cantharidis ; buchu ; pareira brava. Farinaceous or fish diet.

BLADDER, NEURALGIA OF.—Very rare. Sometimes reflex, and depending on conditions of the liver, kidney, nerve-centres, &c.

BLADDER, PARALYSIS OF.—A name applied to loss of power of the bladder from nervous affections. Weakness from injury or disease of its muscular walls is called atony (which see). *Causes.*—Injuries or diseases of the spinal cord and brain ; reflex paralysis from operations, especially those for haemorrhoids ; shock ; debilitating diseases, especially continued fevers ; sexual excesses, especially in old men ; mechanical injury, e.g. in protracted parturition ; over-distension ; severe inflammation ; hysteria. *Symptoms.*—First retention, and then incontinence also. Paraplegia often present. The distended bladder forms an abdominal tumour. *Prognosis.*—Depends chiefly on cause. Sometimes fatal, even when promptly relieved. *Treatment.*—Pass a full-sized catheter ; only partially empty bladder at first if the distension be great ; regular catheterism twice a day ; cathartics ; tonics ; strychnine ; cantharides ; iron ; quinine ; arsenic. Electricity. Counter-irritation ; cold douche. If possible, avoid catheterism in hysterical cases ; try ordinary remedies for hysteria.

BLADDER, PUNCTURE OF.—1. Supra-pubic : incise skin for

half an inch in middle line, just above pubes ; then plunge in curved trocar downwards and backwards ; leave a soft catheter in the wound. 2. Per rectum. Guide a curved trocar on the left index finger in the rectum till the point can be placed against the bladder, in the middle line, just behind the prostate. During this first step, keep the trocar quite sheathed ; then project the point, and plunge the instrument into the bladder ; leave in a soft catheter. 3. For hypertrophied prostate, R. Harrison punctures through perineum and prostate (*Brit. Med. Journ.*, Dec. 24, 1881).

BLADDER, RUPTURE OF.¹—The bladder is generally full at the time, and the patient often intoxicated. The usual causes are the passage of a heavy waggon over the abdomen, a fall or blow on the hypogastrium, a wound, or extreme retention of urine. *Symptoms.*—Sudden and violent pain in the pelvis or hypogastrium ; great desire to urinate, but no urine passes ; the catheter readily enters the bladder, but draws off only a small quantity of urine, which may be bloody. Collapse, then peritonitis. *Prognosis.*—Almost always fatal, except where there is an open wound, with the peritoneum uninjured. *Treatment.*—Use a catheter open at the extreme tip, to keep the viscera empty ; do not pass it far into the bladder ; use the proper remedies for peritonitis, especially opium and warm applications, but avoid depletory measures. If you feel sufficiently sure of your diagnosis, open the abdomen antiseptically, cleanse it, and sew up the rent in the bladder. There can be little doubt but that if this treatment could always be resorted to promptly, the accident in question would lose most of its dangers.² Several experiments bearing on the point have been unintentionally performed in the modern practice of abdominal surgery.

BLADDER, STAMMERING OF, or, rather, of urinary organs.—A condition in which, without any more visible organic disease than exists in stammering of the vocal organs, the sufferer cannot micturate freely at will. The stammering is usually

¹ A series of papers on this subject, by W. Rivington, commenced in *Lancet*, June 8, 1882.

² Sir Wm. MacCormac has already had signal success with this treatment. (See *Lancet*, Dec. 11, 1886.)

aggravated by anything which directs the patient's attention to the act of micturition, or which makes him 'nervous,' or by temporary disorder of digestive or urinary organs. *Treatment.*

—Strengthen general health, attend to digestion and state of urine. Teach patient to pass a catheter for himself, so that he may be free from fear of retention (Paget's *Clin. Lect.*).

BLADDER, TUBERCLE OF, seldom, if ever, occurs except with tubercle of other urinary organs. *Symptoms.*—Those of ulceration in a tuberculous patient. Bacilli in urine. *Prognosis.*—Bad, perhaps hopeless. *Treatment.*—That of tuberculosis: anodynes; rest.

BLADDER, TUMOURS OF,¹ are : 1, fibrous, 2, villous; or 3, cancerous and not villous. The first may cause no symptoms, or, if unfortunately situated, those of obstruction or irritation. The second causes constant haemorrhage, which is generally at last fatally exhausting. For the third see BLADDER, CANCER OF. The catheter must be gently used where there is obstruction; mild astringents and rest for haemorrhage: strength to be supported by chalybeates, good diet, &c. In women, vesical tumours may sometimes be felt and removed through the urethra. In men the bladder can be examined through an opening in the perineum. (See *Bladder, Digital Exploration of.*) Small tumours might be removed through a perineal incision. Large growths require a supra-pubic operation, as has been practised by Billroth and many others. (See 'Lithotomy, Supra-pubic.') The villous growth is sometimes the cause of severe pain, and may or may not be cancerous. Papilloma of bladder is always attached to trigone between the two ureters (Rindfleisch).

BLADDER, WASHING OUT, may be done either with a double-current catheter, or with Glover's apparatus, with Bigelow's apparatus, or with a syphon-tube.

Bleeding.—Venæsection. Veins used: median-cephalic, median basilic, external jugular, saphena veins near ankle, veins of scrotum. Instruments required: bleeding-tape or

¹ Berkeley Hill gives references to the literature of the subject, *Med.-Chir. Trans.*, 1882, p. 52. Stein's work is said to be very complete, New York, Wood & Co., 1881. See also Küster in Volkmann's *Clin. Lectures*, No. 269.

bandage, bowl, lancet, pad, sponge, and water. Apply tape to middle of upper arm, tight enough to congest veins, but not to affect pulse. Hang arm down a little while; then choose spot and apply thumb just below it. Pass lancet gently and obliquely into vein, and enlarge opening without deepening incision; draw off enough blood. If necessary, make patient work his hand, opening and shutting it. Finally, apply pad over wound; fix it with the tape; put arm in sling for two days. In opening external jugular, put the pad just above the clavicle, and cut in the direction of the fibres of the sternomastoid. Bathe the veins of the scrotum with warm water before and after opening them. Arteriotomy.—Cut the temporal artery, or its anterior branch, half in two transversely; when enough blood has flowed, divide it completely, and apply a pad and bandage.

Blenorhœa.—Gleet. *Vide GONORRHœA.*

Blood-cyst. *See TUMOURS.*

Blood-poisoning. *See PYÆMIA.*

Boils.—*Causes.*—Debility or plethora (but these causes are probably never sufficient when uncomplicated); change of diet; excessive perspiration; hydropathy; sea-bathing; influences of dissecting-rooms; training; spring and early summer season; diabetes; diseased meat; irritation of sexual organs; local irritants of various kinds, *e.g.* edge of a frayed shirt-collar; poultices. *Symptoms.*—The local appearances are well known. There is rarely any fever. Sometimes premonitory symptoms, such as feeling of chilliness, bad temper, &c. *Pathology.*—In the first instance, a boil is frequently indistinguishable from an acne-spot. Indeed, in a person suffering from an attack of boils, almost any acne-pimple can be irritated into a boil by persistent friction, or by exposure to some continuous irritant, such as the sea-water constantly wetting the wrists of fishermen. A boil is a local cellulitis, often spreading from an inflamed sebaceous follicle; and the reason of this spreading is in many cases, persistent local irritation. As it is quite as easy to protect from local irritation, and to check acne, as to cure the specific cause of boils, if there be one, this view of boils is of practical importance. The 'core' of a boil is a

central slough of cellular tissue. *Treatment*.—Local. Soap plaster. Poultices or water-dressing should be avoided, as they bring out fresh boils. Incision (complete) of very painful ones. Ext. belladonnae and glycerine on lint. Boils may be aborted by the application of a strong caustic to the commencing vesicle; strong carbolic acid (Eade of Norwich). *General treatment*.—Regulate the diet. When any poison appears to have been absorbed, use eliminative treatment, e.g. purgatives, Turkish bath; moderate exercise; light clothing; arsenic; yeast, one tablespoonful three times a day. See Smith's article in Holmes's *System*. Bathe part where the boils chiefly appear with water as hot as it can be endured, and, above all, remove every cause of local friction or chafing.

Bones, Diseases of, resemble those of the soft tissues, but are remarkable for the comparative slowness with which the pathological changes usually take place.

BONE, ABSCESS OF.—Most usual seat, head of tibia. *Causes*.—Obscure, sometimes injury. *Symptoms*.—Those of osteitis and periostitis confined to a circumscribed locality. An abscess is suspected because of the persistence of the symptoms, and because of the localised and circumscribed tenderness. *Diagnosis and Treatment* require the same proceeding, viz., trephining at the tenderest spot. Generally the abscess is here very superficial. The trephine has in some cases just missed the cavity: Holmes advises in such cases to perforate the walls of the trephine hole in several directions in search of the pus. Scrape out the cavity thoroughly, insufflate iodoform and dress antiseptically. *Prognosis* is excellent when the trephine pierces the abscess; otherwise there is danger of abscess opening into neighbouring joint.

BONE, ATROPHY OF.—*Causes*.—Injury, e.g. fracture; chronic inflammation; disuse, e.g. in the case of the bone of a stump; old age, e.g. atrophy of the lower jaw; pressure, e.g. that of a tumour. *Pathology*.—The bone becomes not only smaller, but its cancellous and medullary spaces enlarge; a certain amount of fatty degeneration is frequent.

CARIES.—*Causes*.—Predisposing are scrofula, syphilis, and constitutional weakness, such as arises from old age. Exciting

cause, often some injury. *Pathology*.—Chronic inflammation causes the corpuscular and vascular elements of the soft parts of bones to increase at the expense of the earthy parts; the young cells seem, as it were, to corrode the walls of the lacunæ, &c., in which they lie; these corrossions, spreading and uniting, may cause destruction to an indefinite extent; the bone thus corroded is dissolved, and is either absorbed or flows away in the discharges. Around the region of caries is sometimes a zone of sclerosis, *i.e.* of bone in which the inflammatory new material has ossified between the trabeculae of the original bone. *Symptoms and Diagnosis* are those of ostitis leading to the formation of an abscess. When this opens, a probe can often detect the softened bone. If the probe will not reach the disease, the occurrence of certain deformities, *e.g.* Pott's curvature, may offer a sure sign. Scrofulous caries usually attacks the vertebræ, articular epiphyses, phalanges, and metacarpal bones. Syphilitic ulceration affects mostly the tibia, cranium, sternum, hard palate, and nasal bones. *Prognosis*.—Ulcers of bone often cicatrize: bad cases not very hopeful. The younger the patient, and the less important the bone, the better the prognosis. Danger of amyloid disease, and fatty degenerations of important organs supervening. *Treatment*.—Constitutional for the scrofula or syphilis, &c. Local.—See also *Strumous Disease of Bone*; *Spine*, *Caries of*, &c.

HYPEROSTOSIS is the term applied to an overgrowth of bone, general so far as the bone or set of bones affected is concerned, local inasmuch as the hyperostosis seldom, if ever, attacks more than a limited part of the skeleton. The bones of the face seem especially subject to this rare disorder. See *Path. Trans.* vol. xvii.

HYPERTROPHY OF BONE is commonly the result of inflammation, which may or not be specific. The cause should be treated. The disease may follow a blow.

INFLAMMATION OF BONE.—Three chief varieties, according to part mainly attacked, *viz.*, ostitis, periostitis, and osteomyelitis.

1. *Ostitis*.—Inflammation may begin in the bone proper without affecting the periosteum or medulla at first. *Causes*.

—Though it is often excited by an injury, there is usually some predisposing cause—syphilis, struma, or simple constitutional debility. *Symptoms.*—Deep-seated aching pain, worse at night, and other symptoms, all like those of periostitis. *Results.*—It usually ends in either caries or sclerosis. (See *CARIES*.) *Treatment.*—Counter-irritants, e.g. iodine, or warmth and moisture locally, or cold applications. Rest, elevated position, purgatives. Treat cause ; iodide of potassium. Linear osteotomy in bad cases—Erichsen. Linear osteotomy is the longitudinal division of the part of the bone affected, down to the medullary canal, by a Hey's saw. See also *Strumous Disease of Bone*.

2. *Periostitis, Chronic or Sub-Acute.*—*Causes.*—Syphilis, rheumatism, injuries ; may be secondary to ostitis, or spread from an inflamed articulation. *Pathology.*—It is often accompanied by superficial inflammation of the bone itself. The two layers of the periosteum (internal, fibrous, and external, cellulo-vascular) cannot be separated from each other, but are swollen, infiltrated with young cells, and traversed by dilated capillaries ; they are easily separated from the adjacent bone, whose surface is generally covered with small nodules of new bone ; the general opinion is that these nodules (osteophytes) grow from the periosteum ; periostitis, with the formation of these osteophytes and without suppuration, is usually syphilitic. When suppuration occurs it may be without any destruction of bone, caries or necrosis ; but usually the bone is rough and gnawed, often to a considerable extent : this occurs especially in strumous periostitis. Then again, in other cases of chronic periostitis, a soft fluctuating swelling forms, consisting, not of pus, but of granulations springing from carious bone : these cases are usually also strumous. *Symptoms.*—Swelling, aching pain, worse at night : heat : skin not usually reddened ; swelling, mostly in the form of a node. *Prognosis.*—Usually ends in resolution, often causes thickening of the bone, growth of osteophytes ; rarely suppuration. *Treatment.*—See *OSTITIS*.

Periostitis, Diffuse.—*Causes.*—Age, usually about puberty ; sex, mostly in boys ; generally follows injury ; sometimes strumous. The effusion strips the periosteum from the bone and almost always causes necrosis, sometimes of an entire shaft of a

long bone. *Pathology*.—Attacks chiefly the long bones, especially the femur; medulla may be coincidentally inflamed: in a typical case, in which both periosteum and medulla are affected, the vessels of each are highly injected, and the intervascular tissue infiltrated with young corpuscles; this stage may end in complete resolution, in ossification of some of the inflammatory new formation; or, as in most cases unfortunately, it may end in suppuration; then the skin reddens, the œdema becomes marked, and neighbouring joints swell; the suppuration separates the periosteum, not usually from the whole shaft, but frequently from half of it, though often only on part of the circumference; except in rare instances in small children, necrosis is now inevitable. (See BONE, NECROSIS OF.) *Symptoms*.

—Femur or tibia usually affected; swelling, heat and pain, easily confounded with cellulitis or acute rheumatism, but it does not spread over the joints above and below the bone; both local and constitutional symptoms very severe; suppuration; then rigors, glistening skin, fluctuation, &c. For further course, &c., see NECROSIS. *Prognosis*.—Highly dangerous; death may occur before suppuration, or may result from exhaustion or pyæmia afterwards. *Diagnosis*.—From acute rheumatism or cellulitis; care only required; no rheumatic affection of heart, or any separate joint; fever different, &c. *Treatment*.—Rest, elevated position: local applications, warm fomentations; free incision when abscess has fairly formed; incisions to remove tension at an earlier period usual. Such incisions should be made antiseptically. Spontaneous openings usually too small and rather tardy in occurrence. *Vide* also NECROSIS.

3. *Osteo-myelitis*, or inflammation of the medulla of a bone, is rare, except as the result of direct injury, e.g. from compound fracture or after amputation through a bone. Inflammation of a bone may be judged to begin in the medulla if the swelling does not appear till some days after the severe local pain; there is always violent fever; the periosteum separates from the diseased bone without being pushed off by suppuration; the prognosis and treatment resemble those of diffuse periostitis, only the former disease is even more serious;

authorities are divided as to whether a limb known to be affected with acute osteo-myelitis should be amputated or not; a limited osteo-myelitis, after amputation and leading to a slight necrosis, is frequent, and not necessarily serious. The bone should be trephined and scraped out antiseptically. With regard to the *pathological* nature of osteo-myelitis, when it has not spread from a strumous joint it usually depends, in all probability, on infection with bacilli, said to be identical with those of common furuncle. Hence the name of 'infective osteo-myelitis.' See also *Strumous Disease of Bone*.

I have myself scraped all the marrow out of the shaft of the femur, afterwards washing out with, successively, solution of corrosive sublimate (1-1000) and concentrated ethereal solution of iodoform. The bone rapidly recovered without any necrosis.¹

BONE, MALIGNANT DISEASE OF.—True carcinoma of bone is said to be always secondary, never primary. Most so-called 'cancers of bone' are sarcomata. For full details as to structure of 'osteoid cancers,' see Walsham in *St. Barth.'s Hosp. Rep.*, vol. xv., and for full details as to clinical history of malignant tumours of bone see Butlin on Sarcoma and Carcinoma. Sarcomata of bone commence either centrally or subperiosteally. The latter are far more likely to recur and to infect the system than the former. Lower end of femur and upper end of tibia are the most common seats of central sarcoma. The lungs are the usual seats of secondary infection. Both central and periosteal tumours of bone frequently become ossified (osteo-sarcoma, osteo-chondroma, &c.). However much the shaft of the bone may be affected, the articular cartilage remains healthy. Some tumours are perfectly encapsuled, others infiltrate every neighbouring structure. The bone may give way at the seat of disease, a fracture thus resulting. When carcinoma of a bone does occur, it is usually encephaloid. *Diagnosis.*—*Vide CANCER.* Enchondroma and even cancellous exostoses sometimes resemble malignant tumours in their rapid growth. But they may be recognised by their hardness. *Prognosis.*—As above mentioned, central sarcoma is less likely to recur than

¹ See *Annals of Surgery*, Jan. 1885.

periosteal sarcoma. Frequently no recurrence takes place after thorough removal, and these tumours occasionally reach a large size before infecting the system. *Treatment.*—Excise, except when disease has infiltrated regions which cannot be removed, *e.g.* certain parts of the skull. Unless the tumour is evidently circumscribed, remove the whole bone. This generally necessitates amputation at the joint above. But in cases of disease of the lower end of the femur, it is not usual to exarticulate at the hip, that operation being so dangerous. Still, when the cancer is soft and diffuse, even this risk should be run.

MOLLITIES OSSIUM.—A disease allied to fatty degeneration of bone. *Causes.*—Mostly attacks females ; age, middle life or later ; pregnancy. *Symptoms.*—At first, rheumatic pains, then various bones soften and bend, and afterwards fracture. The general health is only injured by the physical effects of the resulting fractures and deformities. The chest and spine being deformed, the thoracic and abdominal viscera may be compressed, and a distorted pelvis impede delivery. Large quantities of phosphates in the urine. *Diagnosis.*—From rheumatism, syphilis, tabetic disease, and cancer ; a bone fractured through the weakening effect of cancerous deposit gives way suddenly without bending previously. *Prognosis.*—Almost always fatal, sooner or later, through weakening the power of the constitution to resist intercurrent disorders ; rarely fatal through its own cachexia ; cases of recovery are excessively rare. *Treatment.*—Tonics, cod-liver oil, phosphates, attention to digestive functions ; special gymnastics for the deformities.

BONE, NECROSIS OF.—*Causes.*—The same as those of perios-
titis, osteitis, and osteo-myelitis. Necrosis of the jaw occurs, less frequently now than formerly, among workers in phosphorus ; and it is said that the phosphorus fumes attack only those with unsound teeth. *Pathology of Necrosis.*—Dead bone is bloodless, and either white, or else darkened by the action of air, pus, or blood ; on the surface lately continuous with living bone it is rough and corroded, but on the free surface usually smooth. The process of separation of necrosed bone is as

follows : granulations form at the plane of contact of living and dead bone, and these granulations dissolve the earthy medium still uniting the dead to the living bone, thus setting the former free ; the soft tissues in contact with dead bone loosen from it everywhere, and often a layer of pus intervenes ; then the dead bone lies in an abscess-cavity. When part or the whole of the shaft of a long bone necroses, these same neighbouring soft parts, most especially the periosteum, proceed, as a rule, to build a shell of new bone, within which the necrosed bone lies ; this shell is perforated in one or more places by cloacæ (passages for the egress of discharge) ; the piece of necrosed bone is called the *sequestrum* ; it takes months to separate from the living bone ; it is eventually either discharged or absorbed, or removed by operation, or it may remain even for years. So long as it remains, the new bone around it usually grows thicker ; when it is removed the remaining cavity fills with granulations, which ossify ; gradually the new bone, by a process of external absorption and internal growth, gets to resemble more and more the shape and consistence of the original bone, whose place it is to take. Practically speaking, only the smallest sequestra can be absorbed. In necrosis of flat, and of short spongy bones, there is small prospect of thorough reproduction ; in these cases, necrosis is usually combined with caries, and often with a chronic constitutional disorder. Necrosis, when confined to the surface of a bone, is called 'superficial,' and when to the interior of a bone, 'central' : in the former the sequestrum is called an 'exfoliation' ; central necrosis constitutes almost an independent disease.

Pathology of Central Necrosis.—It is the result of inflammation of the deeper parts of a bone, and is usually accompanied by caries : it leads to a bone-abscess, to a simultaneous periostitis on the neighbouring external surface of the bone, and to a consequent apparent thickening of the bone. Note, though central necrosis is pretty sure to lead to abscess, yet abscess of bone does not usually imply necrosis.

Symptoms and Diagnosis.—Necrosis may be fairly presumed to have occurred when (1) inflammation of a long bone or its

periosteum has been acute or prolonged, while (2) extensive hard thickening has taken place, indicating the formation of new bone, and (3) the pus from any sinus existing is thick and yellow. In caries, on the other hand, the spongy bones are the usual seat, the formation of new bone is usually slight, the pus thin and serous ; but the probe is required to settle the diagnosis. If gently used it causes little or no pain in necrosis, usually much pain in caries ; the sequestrum in necrosis feels smooth and hard ; carious bone is rotten ; but it is to be remembered that the probe may fail to reach the sequestrum, and that in a few cases enormous thickening exists with caries only. The probe should be pressed firmly against the sequestrum, to feel if it is movable and ready for 'sequestrotomy.' Necrosis is sometimes found to have occurred without any history of precedent inflammation. This is called 'Quiet Necrosis.' *Vide Paget's Clin. Lect.* and Morrant Baker, in *St. Barth.'s Hosp. Reports*, vol. xiii. Prognosis depends on the acuteness of the inflammation, and on the extent of bone involved. Acute necrosis of the whole shaft of a long bone is excessively dangerous. Pyæmia sometimes follows the opening of the abscess.

Treatment.—Before suppuration, try to cause resolution by rest, counter-irritants, cold, &c. ; when abscess has formed, open it antiseptically ; some recommend incisions before then, merely to relieve the tension of the periosteum ; Billroth condemned this plan, saying that it predisposes to pyæmia, but he was then speaking from a non-antiseptic experience. When necrosis has actually taken place, you must wait till the sequestrum has loosened and then remove it, treating the general health in the meantime. Unless the sequestrum can be felt loose, a very considerable time, even many months, had better be allowed before attempting to remove it by operation. The presence of a sequestrum favours the formation of new bone, and the former, therefore, must not be too hurriedly taken away where there is danger of the latter being deficient. *Operation for Necrosis.*—Tourniquet, or (much better) Esmarch's bandage ; sponges, &c., scalpel, Hey's saw, cutting-pliers, ~~crossis~~-forceps, gouges, chisels, hammer, probe, bandages, ~~an~~

minor instruments. Incise the soft parts: it is often advisable to unite two sinuses by the incision. Cut a sufficient, but no larger, opening in the sheath of new bone: divide the sequestrum if it cannot easily be removed whole. When the whole shaft of a long bone has necrosed, the general opinion is that it had better be removed as soon as the acute symptoms have passed away, unless the epiphysial cartilages have been involved in the inflammation. Such early removal lessens the chances in favour of satisfactory reproduction of the bone. A new shaft may be expected to form, unless the epiphysial cartilages have been destroyed: in this case a new shaft can only be looked for when the sequestrum is left for a long time *in situ*. As a matter of fact, it is doubtful whether precisely the whole diaphysis is ever necrosed, leaving the epiphysial cartilages. If the necrosis be extensive, and for some reason cannot be removed, while the patient's health is giving way seriously, amputation must be done.

BONE, NEUROSES OF.—Besides the atrophy and arrested growth which sometimes occurs in paralysed limbs, and which may possibly be the effect of disuse, the bones of patients with tabes dorsalis are, in some instances, liable to fracture from very slight causes. Union takes place readily enough, however. The same class of patients suffer from Charcot's joint-disease, *q.v.*

OSTEAL CACHEXIA. *See SCURVY OF INFANTS.*

OSTEITIS DEFORMANS.—A very rare disease, first described by Sir James Paget in the *Medico-Chirurgical Society's Transactions*, vol. ix. **Chief Characteristics.**—General enlargement of the bones, with sufficient softening to permit slight loss of height (several inches) through arching of the long bones of the lower extremities and bending forward of the head on the breast: ribs also thick and immovable; skull thickened; cranial sutures obliterated; compact substance greatly increased. According to Butlin, the microscopic changes indicate that the disease is an inflammation rather than a new growth. In this view Paget concurs, hence the name 'osteitis.' But the frequent coincidence of sarcoma or carcinoma with this affection is most remarkable. Little or no pain usually, only

clumsiness. Disease lasts for years, and death has often resulted from the intercurrence of the above-mentioned malignant tumours. The usual remedies for other forms of osteitis appear to be of no avail.

Allied to 'osteitis deformans' are the cases described by Czerny (*Wiener med. Woch.*, Sept. 27, 1873), and thus noticed by Paget:—'A rather acute inflammation of the lower part of the tibia and fibula, inducing softening and angular bending, and then followed by hardening.' All these cases occurred in young men.

I mentioned, in the second edition of this work, a remarkable case in which the right tibia and fibula of a lady, aged 60, changed in shape from straight to nearly a semicircle in a few months. The curvation was pretty evenly distributed, occupying the upper quite as much as the lower part of the bones. I have lately seen another similar, but less severe case, also in an old woman.

OSTEO-ANEURISM, or PULSATING TUMOUR OF BONE.—Almost always malignant; usually occurs in cancellous ends of long bones, in skull, and pelvis. *Symptoms.*—A tumour, 'oval, uniform, and elastic to the touch, growing slowly'; pulsation and a bruit (the latter sometimes, but rarely, absent). Tumour may be partially emptied by pressure, and then the bony margin of the cavity in which it lies may be felt. Crackling shell of bone sometimes felt over it. *Diagnosis.*—1. The diagnosis of innocent from malignant pulsating tumour: in the latter case there may be evidence of malignant disease elsewhere; the tumours may be multiple; the growth is probably more rapid and the tumour more painful. 2. From ordinary aneurism: by considering the situation and the characters mentioned above. *Prognosis.*—Depends upon whether tumour is malignant or not. *Treatment.*—For innocent cases try pressure on, or ligature of, the main artery; Esmarch's bandage might be tried; innocent tumours have also been gouged out. All other cases require amputation.

STRUMOUS DISEASE OF BONE.—*Causes.*—*Vide SCROFULA, and TUBERCLE.* *Symptoms.*—Swelling, usually of an indolent and chronic character; superjacent skin commonly pale, hence

the term 'white swelling.' Sometimes signs of scrofulous disease in other parts. As the disease advances, there are symptoms of caries and abscess, the latter often appearing far away from the diseased bone. Most of the sufferers are children. The mischief often spreads to neighbouring joints, and the suppuration tends to spread far and wide along intermuscular spaces, &c., before the abscess bursts. *Diagnosis* rests on the local symptoms above given, and on the presence or absence of other signs of strumous disease. In adults, tubercle hardly ever attacks the shafts of long bones. In infants it frequently causes bottle-shaped enlargement of the phalanges and metacarpals and metatarsals (*spina ventosa*). But, throughout life the ribs and the vertebrae are apt to suffer. Tuberclie of the epiphyses subjacent to joints is noticed under the head of 'Joint Disease, Chronic.' *Prognosis*.—Local recovery may usually be expected (in about two years according to Stanley) if the general health holds out, but relapse is very common both in the original seat of the disease and elsewhere. *Expectant Treatment*.—General treatment of scrofula. Locally: complete rest; counter-irritation by painting with iodine, &c. There are special apparatus to give rest to special parts of the body: e.g. for *morbus Coxæ* and for Pott's curvature, *q.v.* *Operative Treatment*.—When it is possible to carry out strict antiseptic methods, open abscess as early as possible, and provide for drainage. But sometimes—e.g. in metropolitan out-patient practice—such methods may not be practicable: then delay opening the abscess, or be content with aspiration from time to time.

When the strumous tissue is accessible, remove it, by erosion if possible. Volkmann's spoon is generally used for this purpose. After erosion insufflate or dust in iodoform. There is good reason to attribute to this drug a specific effect on tubercle. Erosion, drainage, iodoform, and antiseptic dressing, seconded by the proper use of plaster of Paris bandages, form an array of means for treating strumous disease of bone, the results of which, when compared with those of the old-fashioned routine, so often leading to excision and amputation, can only be described as triumphant.

In case of relapse, do not hesitate to promptly repeat operation, again and again if necessary. Try packing with iodoform gauze as an after-treatment.

It is to be remembered that the disease is usually in close proximity to some joint.

Cases sometimes, which are happily exceptional, occur in which fatal tubercular meningitis follows operative interference with strumous bone-disease in a manner to make one suspect inoculation at the time of operation. I have had two such myself, one after excision and the other after erosion of the hip. But the same complication is not uncommon where no operation is done.

SYPHILITIC DISEASE OF BONE.—Usually, if not always, begins in the adjacent soft parts. *Symptoms.*—The first are usually pains like those of rheumatism, and worse at night. They are called 'osteoscopic.' Then nodes are found. These are circumscribed, round or oval swellings, occurring chiefly on such bones as are subcutaneous, but sometimes elsewhere, *e.g.* upon the inner surface of the skull. The primary affection is in the periosteum. Small tendency to suppuration. Production of new bone. Caries and necrosis caused by more acute syphilitic periostitis. Three forms of syphilitic ulceration of bone, *viz.* the annular, the tuberculated, and the reticulated. Dry caries (*caries sicca*) is frequently syphilitic. Syphilis, by destroying the bones, causes peculiar deformities in some parts, *e.g.* flat nose, destruction of palate, &c. Syphilitic ozaena. Epilepsy from pressure of intracranial nodes. *Diagnosis.*—Ulcerations have characteristic syphilitic shape, appearance, and history. Syphilitic nodes are known by their position, hardness, indolence, and liability to nocturnal pains. *Prognosis.*—Good, except in tertiary syphilitic ulceration; bad cases of this are sometimes incurable. *Treatment.* *Vide SYPHILIS.*

TABETIC DISEASE OF BONE. *See JOINT-DISEASE, CHARCOT'S.*

TRANSPLANTATION OF BONE.—The problem of this has been solved by Macewen of Glasgow.¹ In the lower animals, Ollier

¹ See *Proc. of Royal Soc.*, May 19, 1881. An abstract of this paper in *Med. Record*, 1881.

had once succeeded in forming an osseous ring from grafted periosteum, and, in another case, even in transplanting a part of one radius to the other of the same animal.

Macewen appears to have been successful through having (1) included the whole of the osseous tissue in his transplants ; (2) divided them up into small fragments with a sharp instrument before planting them ; (3) used strict antiseptic precautions throughout.

TRANSPLANTATION OF BONE-MARROW.—Bruns succeeded many times in producing new bone by grafting bone-marrow (in large pieces) beneath the skin, but only when the marrow was transplanted from one part to another of the same animal.¹

TUMOURS OF BONE.—The innocent are enchondroma, exostosis, cystic, fibrous, fibro-cystic, and hydatids. *Vide* the various articles, **TUMOUR**, **EXOSTOSIS**, **ENTOZOA**, &c. The great majority of innocent tumours of bone are either exostoses or enchondromata.

ULCERATION OF BONE. *Vide* **CARIES**.

Brain, Abscess of.—Difficult to diagnose and especially from diffuse suppuration of meninges. When first recognised by the surgeon (as distinguished from the physician) its signs have usually appeared some time after an injury. Early symptoms point rather to diffuse meningitis. Sometimes Pott's puffy swelling occurs, with separation of the pericranium. Local pain, tenderness, and heat, possibly recognisable by the surface thermometer ; mind and senses dulled and irritated. Occasionally paralyses and contractions which help to localise the mischief. The *prognosis* is so grave that one need scarcely fear to lay down the rule, 'when in doubt trephine.' If the dura mater is pulseless and bulging, incise it. Even the brain may be searched by exploratory puncture, preferably with the aspirator or blunt director ; of course stop short of the vital centre in the medulla and base. Having found the abscess-cavity, wash it out and drain freely. Strict antisepsis.

Brain, Injuries of. *See* **HEAD**.

Brain, Tumours of.—The most recent and valuable article on the surgery of these, is that by Horsley in the *British*

¹ Bruns on Fracture in *Billroth and Lueke*.

Medical Journal for Oct. 9, 1886. This author describes many details to which he attaches great importance.

Breast, Abscess of.—Three varieties: 1, supra-mammary; 2, mammary; and 3, post-mammary. Abscess in the breast almost always attacks suckling women in a feeble state of health, and generally soon after delivery. First variety is the most common in other people; subjects of third variety are often tuberculous. *Symptoms.*—General symptoms of abscess. Supra-mammary runs a quick course. Intra-mammary causes the greatest pain. Post-mammary pushes the whole breast forwards: in it, too, the fluctuation is, at first, quite deep, and eventually several openings often form. *Treatment.*—On general principles. Deep abscesses should be opened as soon as fluctuation can be fairly felt. Line of incision should radiate from nipple. Quinine.

Breast, Amputation of.—Scalpel, forceps, artery-forceps, sutures, sponges, dressings. Elliptical incisions parallel with fibres of pectoralis major; lower to be made first: separate gland from parts beneath before making upper incision. Proper support and pressure required from dressings. Drainage. Deep sutures, or else buried sutures. Take away plenty of skin and at least clear axilla of *affected* glands as thoroughly as possible. The prognosis as regards recurrence is thereby greatly improved. Pearce Gould urges that, as it certainly is not always possible to detect incipient glandular affection, the axillary glands should always be removed when the breast is amputated.—*Lancet*, April 1882.

Breast, Atrophy of.—Occurs after middle age. It may be caused by the recurrence of new growths. Breasts apparently atrophied may perform their functions properly when called upon.

Breast, Cancer of.—Almost always scirrhus. May be encephaloid or colloid; or may be complicated with blood-cysts. *Causes.*—Obscure. Age, middle and later life, especially from 40 to 50 years. Cancer in youth mostly encephaloid. Sex—female. Depressing influences (?) Change of life (?). Injuries. Family predisposition.¹ Follows chronic eczema of the nipple.

¹ This exerts much less influence than is commonly believed.

Symptoms.—Firstly, of scirrhus. A tumour, hard, nodulated, heavy. Implication of neighbouring tissues, retraction of nipple. Affection of skin, which reddens and thickens, and afterwards ulcerates ; severe pain ; cachexia ; enlarged and hardened glands in axilla, afterwards in neck ; oedema of the arm ; occasional direct infection of the pleura. Constitutional infection. *Encephaloid of Breast* begins as a soft oval tumour, usually deeply placed, grows rapidly, may be mistaken for abscess ; feels like several soft tumours together ; skin ulcerates ; fungus ; sloughing ; bleeding ; glandular infection, &c.

Diagnosis. (Vide TUMOURS OF BREAST.) *Prognosis.*—Almost always recurs after removal. Average duration of scirrhus four years ; longer in old people. *Treatment.*—Palliative or operative. 1. Palliative (only indicated when disease too far advanced for operation) : belladonna, atropine, and aconite externally ; poultices with belladonna. For ulcerated stage, carbolic lotion with oakum ; opium ; iodoform ; ol. eucalypt. ; terebene ; caustics for ulcerated surfaces. 2. Operative. Contra-indications to operation are, 1, considerable affection of skin ; 2, affection of cervical glands ; 3, affection of parts beneath breast ; 4, (?) cancer in both breasts ; 5, great cachexia ; 6, constitutional infection ; 7, very chronic course in old people. Old age and weakness are not absolute contra-indications, nor is ulceration, *per se*. For operation, *vide BREAST, AMPUTATION OF.*

FUNCTIONAL DISORDERS OF BREAST.—The milk may be excessive or deficient, or (3) it may flow away (galactorrhœa), or (4) may congest the gland. For galactorrhœa, tonics, iron, iodides ; externally, belladonna, hemlock (and internally too, with opium). When milk curdles, and forms hard lumps in the glands, use stimulating liniments.

GALACTOCELE.—A milk tumour, caused by the dilatation or by the rupture of a duct. Forms during lactation only. At first fills and grows larger each time the child sucks ; fluctuation ; no pain ; no discolouration of skin ; afterwards, fluid parts of contents tend to be absorbed. At this last stage, the main element in diagnosis is often the history. *Treatment.*—Incise

or puncture with a trocar and cannula, obliquely from nipple towards tumour.

HYPERTHESIA OF BREAST AND NEURALGIA OF BREAST.—*Causes.*—Chiefly lie in state of uterus, ovary, or other organs of generation; weakness; ‘nervous temperament.’ Mostly young girls; sexual depravity. *Symptoms.*—Pain, variable, often intense, shooting into arm, neck, and back; superficial tenderness, often exquisite; sometimes redness and swelling; swelling of nipple. *Diagnosis.*—Rests on age and character of patient, on variability of pain, and superficial nature of the tenderness, and on negative signs. *Treatment.*—Remove the cause; if necessary, use the speculum, but avoid it if possible; correct bad habits; treat all disordered functions; use the ordinary remedies for restoring the tone of the nervous system. Avoid handling and examining more than is necessary. Emp. belladonnæ.

HYPERTROPHY OF BREAST.—Two forms, viz. 1, firm; 2, pendulous and loose. *Causes.*—Unknown. Appears soon after puberty. *Symptoms.*—In form 1, the breast projects, large and firm; in form 2, the organ hangs down relaxed, and may reach an enormous size. Both breasts generally affected. Neuralgia often occurs with it. *Treatment.*—Not very successful. Support and pressure. In extreme cases, amputation may be done.

INFLAMMATION OF BREAST.—May occur even in infancy, but most cases occur in suckling women. *Causes.*—Debility; protracted suckling; the irritation of some disease of the nipple; obstruction to a gland-duct; often coincident with defective nipple. *Symptoms.*—Lobular induration, perhaps owing to the obstruction of a duct: this is called a ‘lump, knot, or coring of the milk;’ pain; tenderness; redness; shivering; feeling of illness. The signs of mere inflammation may disappear after involving more of the breast, or may give way to those of abscess. *Treatment.*—Locally: rest; support; warmth; moisture; belladonna. If necessary, the milk had better be drawn off. General treatment: purgatives; quinine; general rest also.

LOBULAR INDURATION OF BREAST.—See *Painful Mammary Tumour.*

MALFORMATION OF BREAST.—The breasts may be absent, or may be excessive in number, or they may occupy strange situations, *e.g.* the back or groin.

BREAST, TUBERCLE OF.—Exceedingly rare. Affects glands early. *Diagnosis.*—Difficult at first. *Treatment.*—Excise, and also clear out axilla. Volkmann says an inflamed non-tuberculous breast will sometimes lead to tuberculosis of the axillary glands.

TUMOURS OF THE BREAST.—Under this head will be noticed such new growths as are not carcinomatous, viz.: 1, chronic mammary tumour, including 'painful mammary tumour'; 2, cysts; 3, fibromata; 4, enchondromata; 5, osteomata.

1. *Chronic Mammary Tumour.*—(Synonyms: *Adenoma*, 'Hypertrophie partielle,' *Mammary glandular tumour*, *Hydatid disease of the breast* [Sir A. Cooper], *Sero-cystic sarcoma*.)—The above names are not all strictly synonymous; some, such as adenoma, are applied to growths which, to the naked eye, appear of a solid, fibrous nature; others, *e.g.* sero-cystic sarcoma, are applied to tumours consisting chiefly of cysts with solid growths inside them. These latter are really of a sarcomatous nature; the true 'chronic mammary tumour' is more of the nature of adenoma. *Causes.*—Age, most frequently from 20 to 30; great majority of cases occur in single women; blows, squeezes, lacteal irritation, 'hysterical temperament,' 'uterine irritation,' 'sexual excitement of an irregular kind' (Erichsen). *Symptoms.*—Commence as a hard nodule, usually painless and not imbedded in the mammary gland, but movable; may be pedunculated; growth slow, but in rare cases very rapid; mammary gland may atrophy; almost always single; size, perhaps considerable in old tumours; tumours prominent, not attached to skin; afterwards ulceration and fungation. *Diagnosis.*—(A) *vide* lobular induration of breast; (B) from cancer: 1, slow growth; 2, usual freedom from pain; 3, non-implication of skin; 4, healthy state of glands; 5, no retraction of nipple; 6, outline rounded; 7, consistency rather elastic than hard; 8, mobility. When a fungus forms, the hole in the skin is clean-punched. *Prognosis.*—The true chronic mammary tumour usually grows slowly, and does not return if removed; local recurrence is common in the case

of the sero-cystic sarcoma. *Treatment*.—Excision ; the tumour may be simply enucleated, or in very bad cases, especially of the fungating sero-cystic kind, the gland may be removed as well.

Painful Mammary Tumour includes the cases often described as *Lobular Induration of the Breast*, or the term may be applied only to such 'chronic mammary tumours' as are the subjects of severe paroxysmal pains. In *Lobular Induration of the Breast*, one or more lobes, or the whole breast, is thickened and hardened, but there is no tumour distinct from the breast, and the hard part does not project ; therefore, the hand laid lightly on the breast does not feel any tumour. Occurs mostly in single or sterile women ; age, from 25 to 45 ; pain often shoots along course of intercostal-cutaneous nerves going to gland ; tenderness on pressure over their course. *Treatment* for such painful conditions.—Support, if the breasts hang down ; pressure ; belladonna plaster ; the usual constitutional and local remedies for neuralgia ; attention to the generative organs, which are often functionally deranged.

2. *Cystic Tumour of the Breast* may be—1, simple, or 2, multiple, or 3, combined with sarcoma, or 4, sanguineous, or 5, hydatid, 6, milk-cysts. 1. Simple cysts vary greatly in size and in tension ; they may be so hard as to be mistaken for solid tumours : diagnosis may be confirmed with a trocar and cannula. May arise from obstructed ducts. 2. Multiple cysts are rare, unless combined with solid growths. 3. Cysto-sarcoma : for its symptoms and treatment see 'Chronic Mammary Tumour,' of which it may be regarded as one form, the other being adenoma. 4. Sanguineous cysts may cause bleeding from nipple. 5. True hydatids are very rare ; the term 'hydatid disease' used to be applied to sero-cystic sarcoma of the breast. 6. Galactocele, *vide* above.

3. *Fibromata*, 4. *Osteomata*, 5. *Enchondromata*, of breast, all extremely rare.

Male Breast subject to same diseases as female, but much less frequently attacked. For 'Cancer of Male Breast,' refer, if necessary, to Milton (*Med.-Chir. Trans.* vol. xl.), to Wagstaffe

(*Path. Trans.* vol. xxvii.), and to Schuchardt (*Arch. f. klin. Chir.* 1885).

Bronchocele.—Two kinds: *ordinary and exophthalmic goitre*; the former may be *endemic* or *sporadic*, *simple* or *cystic*, and it may be *acute*. *Causes.*—Immediate cause unknown, but certainly poverty and an unhealthy mode of living greatly con-
duce to it. *Character and effects.*—Enlargement of the thyroid gland or part of it, fluctuating if cystic; occasionally causes dyspnoea, dysphagia, or loss of voice, or displaces neighbouring parts; cysts usually contain serous fluid when single, grumous fluid when multiple. *Exophthalmic Goitre.*—Pulsation, anaemia, prominence of eyeballs. *Diagnosis* may have to be made from carotid aneurism. *Treatment.*—General hygiene; high, dry, breezy places; iron, iodine internally and externally; iodide of potassium; lead iodide and mercuric iodide ointments; pres-
sure; tapping cysts and injecting them with iodine or iron tincture (3*j.* to 3*ij.* with water); seton; ligature of thyroid arteries; excision when pressure of tumour threatens death. When excising thyroid, tie arteries of gland first (P. H. Watson); then, if convenient, gland may be divided and removed in two pieces (Lister). Beware of opening trachea; collapse of trachea may follow removal of thyroid gland. Removal of isthmus only sometimes followed by wasting of the two lobes and by complete relief. Lately a remarkable tendency to myxoedema and cretinism has been observed as a sequel of excision of the thyroid gland, more especially by Kocher of Berne. For acute bronchocele, if the pressure gets dangerous, tap any cysts and divide the binding cervical fascia. On the cretinoid changes which sometimes follow excision of the thy-
roid, one of the most recent and valuable contributions is Bruns' clinical lecture in Volkmann's Series. Wolfer has lately revived the old operation of tying the superior thyroid artery. Wolfer ties, also, the inferior, and describes a new mode of doing that. (See *Wien. Med. Woch.*, 1886, 29 and 30, and a full abstract by W. Browning in *Annals of Surgery*, Dec. 1886.)

Bruise.—*Possible after-consequences.*—Abscess, contraction or shrivelling (e.g. of the ear after haematoma), permanent

thickening, long-continued pain and tenderness, paralysis of nerve or muscle, necrosis or hypertrophy of bone, a weakness and liability to disease. *Treatment*.—Pressure—uniform, equable, and tight, especially by cotton-wool and starch bandage ; stimulating liniments, ice, cold lotions ; or very hot fomentations ; rest. When the effusion remains, try friction, kneading, or pressure, or remove antiseptically.

Bubo.—*Causes*.—Syphilis (suppurating bubo caused by the soft chancre), gonorrhœa, and any irritation about skin of external genitals. When there has been no visible sore, the bubo is called a 'sympathetic' one. 'Bubon d'embleé' means a syphilitic bubo from absorption of virus, without intermediate ulceration ; scrofulous constitution (?) or severe local disease of genitals aggravates bubo. *Symptoms*.—Those of inflammation and sometimes suppuration of and around the inguinal glands ; suppuration may greatly undermine and destroy skin ; chronic or acute. *Diagnosed* from deeper abscesses by its connections, situation, history, and course. *Prognosis*.—Proper treatment will often prevent abscess ; liability to slough and open arteries. *Treatment*.—1, to prevent abscess ; rest, counter-irritation, blisters, iodine-paint, extr. belladon. and glycerine on cotton-wool, pressure, cold, leeches. General treatment for cause : attend to bowels : quinine, iron. 2, when abscess forms, poultice, foment, then open freely ; destroy rotten skin ; stimulating ointments, red oxide of mercury powder or ointment, ung. resinæ, caustics when required ; iodoform.

Creeping Bubo heals at one side, extends at other : horseshoe shape.

Bunion.—Thickening of bursa over head of metatarsal bone of great toe ; occasionally the term is applied to an enlarged bursa on the foot. *Symptoms*.—First a tender spot, then swelling, effusion, liability to inflammation ; suppuration, sinus, large cavity with narrow orifice, thin discharge ; distortion of toe outwards, displacement of flexor longus pollicis tendon in same direction ; changes like those of chronic rheumatic arthritis in the subjacent joint, or more serious articular disease, which may lead to fatal inflammation of the foot ; may be starting-point of senile gangrene. *Prognosis*.—Rarely altogether curable when

it has long suppurated. *Treatment*.—Rest ; remove the pressure of the boot, which is always the *cause* ; restore the toe to natural position by mechanical contrivances, or by osteotomy of the metatarsal near its head, an operation analogous to Macewen's for genu valgum (A. Barker and C. Hoar) ; corn plaisters, soap plaisters, iodine or ointments of iodides to produce resolution ; when discharging, apply stimulating dressings, *e.g.* unguiculæ resinæ ; when inflamed, poultices, fomentations, &c.

Burns, including Scalds.—Six degrees : 1, cutaneous hyperæmia ; 2, blistering : no mark left after recovery, except occasionally a slight stain ; 3, true skin partly destroyed ; cicatrix, but no contraction ; 4, total destruction of true skin ; possible or probable great deformity ; 5, muscles, &c., destroyed ; 6, a whole thickness of a limb charred. *Symptoms*—of the last four degrees are locally those of inflamed and suppurating wounds casting off sloughs. *Constitutional Symptoms*.—At first, those of shock or collapse : then, within forty-eight hours, commences the second stage (of reaction and inflammation). The third stage (of suppuration and exhaustion) begins in about a fortnight. In the inflammatory stage there are fever, and liability to various complications—peritonitis, pleuritis, pneumonia, bronchitis, arachnitis, congestion of brain, ulceration of the duodenum. The symptoms of these special affections are not peculiar, but are liable to be obscure. Third stage : hectic, same visceral lesions as those of second stage. Inflammations are of a low type. Erysipelas, pyæmia, and tetanus. Ulceration of the duodenum occurs most frequently in the second stage, and is found in 12 per cent. of fatal cases of burns : its symptoms are epigastric tenderness (not a valuable sign) and haemorrhage from the anus. *Prognosis*.—Depends on age, extent of surface injured, and, to a less degree, upon depth. Most serious in young children. *Treatment*.—Locally : Rest ; protect part from air ; salicylic cotton, carbolic oil ; bismuth and zinc ointment ; iodoform with vaseline ; or rags dipped in and kept constantly wet with solution of silver nitrate (gr. x. ad $\frac{3}{4}$ j.), or with a concentrated solution of carbonate of soda. Starch, balsam of Peru, flour, &c., or collodion for burns of the first degree. Afterwards the treatment

of simple ulceration. Guard against contraction from cicatrisation. *Vide CICATRIX.* Terebene, iodoform, and oakum for offensive discharges. Do not irritate by dressing too often. Constitutional treatment.—In stage of collapse: opium, morphia subcutaneously, full doses; stimulants cautiously; warmth; chloroform if necessary at first dressing. In later stages watch for and, so far as the patient's state admits, treat the complications. Warmth externally for convulsions. Opium for diarrhoea, but keep the bowels regular. Blood-letting sometimes for the visceral inflammations. Diet chiefly of milk. Judicious stimulants, good food and tonics often indicated; fresh air.

Bursæ.—Situations of chief—acromion, olecranon, great trochanter, tuberosity of ischium, beneath psoas, inferior, superior and outer parts of patella, condyles of femur, popliteal space, tuberosity of tibia, and the os calcis. They also occur on almost any hard prominence, especially if subject to pressure, and under any tendon which glides over bone.

DISEASED CONDITIONS OF BURSÆ.—Five, viz., 1, simple enlargement with fluid contents; 2, enlargement and solidification; 3, enlargement and formation of melon-seed bodies; 4, inflammation; 5, specific affections—syphilis and rheumatism. The changes in rheumatic bursæ resemble those in rheumatic joints. See, e.g., a case by E. H. Bennett, *Dub. Med. Journ.* vol. lxxiv. As a type of all bursæ, let us take the

BURSA PATELLÆ.—All the above diseases may occur here, and most of them are the result of undue and repeated pressure. Inflammation may follow a blow only, but especially a blow on bursæ already enlarged. 1. *Simple enlargement.*—A globular swelling, obviously in front of patella or lig. patellæ, and therefore not in the joint. Fluctuation sometimes, or even transparency. Usually painless. Stiffness. Perhaps no trouble whatever. 2. *Solidification.*—May be judged by the feel, or detected after incision. 3. *Melon-seed bodies* may cause a crackling feel. 4. *Inflammation* causes heat, redness, &c., and leads almost always to abscess. *Treatment.*—For 1. Remove cause; iodine or blistering externally, tapping simply, or with injection of tincture of iodine (3*j.*); incision and drainage,

2. Excise the solid bursa. In dissecting it out, remember the absolutely close proximity of the joint. 3. Melon-seed bodies are to be let out by incision if the bursa is troublesome. 4. For inflammation—leeches, fomentations, poultices, rest, elevation, back-splint. When abscess forms, incise freely. Suppuration may cause cellulitis all about knee, bursting of pus into neighbouring tissues or joint, or disease of patella. Inflamed bursa over *olecranon* often causes diffuse cellulitis of forearm. Bursa in *popliteal space*, and beneath *semi-membranosus*, very liable to communicate with knee-joint. Hence caution in tapping; antiseptics. Enlarged bursa with merely liquid contents can be easily reduced by elastic pressure.

Cæsarian Section. See THE APPENDIX ON UTERINE DISEASES.

Calculus.—*Urinary deposits.*—Table of two classes, organic and inorganic :—

NAME	CHARACTERS	CAUSES	SYMPTOMS	TREATMENT
Urates or Lithates of Ammonia and Soda.	Pinkish yellow, red, or latiterious (brick-dust) sediment; urine scanty, acid, and high-coloured. The precipitate, before subsiding, forms a cloud in the urine, which clears off when heated. Crystalline form—uric acid, mostly rhombic prisms and plates. 'Gravel.'	1. Rapid waste of tissues, e.g., as in fevers; 2, excess in nitrogenous food; 3, dyspepsia; 4, obstructed perspiration; 5, congestion of the kidneys (Golding Bird). Also imperfect respiration. Cold weather will precipitate urates sometimes from healthy urine.	Those of the causes. Sometimes also a slight burning feel in passing water.	Treat the causes. Moderate animal food, plenty of exercise, fresh air, particular attention to the digestion, &c. Friedrichs-hall and Vichy waters.
Urates.	Minute spheres with acicular spiculae of uric acid projecting from them.			
Oxalate of Lime.	Crystalline forms: 1, quadra-tic octahedra; 2, dumb-bell crystals.	'Nervous exhaustion; dyspepsia; over-work; mental distress; excess of saccharine food or alcoholic liquors.	Those of the causes. Occasionally, loss of sexual vigour, or disorder of the sexual functions.	Treat the causes. Regular diet, exercise, &c. Mineral acids.

NAME	CHARACTERS	CAUSES	SYMPTOMS	TREATMENT
Phosphates.	1. <i>Phosphate of Lime</i> .—White, cloudy mass. Crystals : spherules, dumb-bells, rosettes, oblique hexagonal prisms. 2. <i>Phosphate of Ammonia and Magnesia (triple phosphate)</i> . Crystals (large): triangular, truncated prisms, four-sided prisms, irregular six-sided plates ; stellate crystals when ammonia has been added.	Alkaline urine is the immediate cause. It is caused by injuries and diseases of the bladder, especially paralysis and catarrhal inflammations ; renal inflammation ; spinal injury or disease. Nervous exhaustion ; excessive use of alkalies ; the alkalinity of the urine is said to result from the metamorphosis of urea into carbonate of ammonia.	Urine is offensive, and often contains muco-pus. Signs of causative disease.	Treat the causes. See DISEASES OF BLADDER, &c.
Carbonate.	Small and delicate crystalline spherules. Drumsticks.	The causes which determine the change of urea into carbonate of ammonia.	No special symptoms known. Deposit rare.	Treat the conditions which accompany it.
Blood.	Urine a dirty-red colour ; after standing, a slightly flocculent brownish sediment. Heat coagulates the albumen. There may be blood enough to form a clot ; then the urine is dark brownish-red. Or the blood may be quite unmixed with the urine.	1. Kidney disease. Calculi, congestion, inflammation, injury, scurvy, the Bilharzia capensis. Malaria may cause intermittent haematuria. Blood from the kidney is generally mixed uniformly with the urine, and forms blood-casts. 2. Bladder affections ; injuries, stone, tumours. Blood from bladder often flows pure <i>after</i> the urine. 3. Urethra ; blood pure, and comes before or with urine, or without urine at all.	Those of cause. Use Heller's test for blood. Heat urine, then add KHO and heat again. The phosphates then fall down with the colouring matter of the blood. The sediment has a dirty-red colour by reflected, and a splendid blood-red colour by transmitted light.	Rest and internal styptics, e.g., gallic and sulphuric acids, acetate of lead with opium. Dry-cupping the loins also in renal haemorrhage. For vesical haemorrhage use similar treatment and local remedies ; ice to perineum and epigastrium and in rectum. Do not catheterise unless there is retention of urine. If the

NAME	CHARACTERS	CAUSES	SYMPOTMS	TREATMENT
Blood.				clots will not come away without interference, use, cautiously, Clover's exhausting apparatus for lithotomy, or a syringe and full-sized catheter. Ruspi's stypptic, ergot, hazeline.
Pus.	Pus-corpuses, under the microscope, are spheroidal and granular. The pus generally subsides as a dense layer of a 'pale-greenish cream-colour,' which can be mixed thoroughly with the urine by shaking. Not affected by acetic acid. Forms a translucent jelly when liquor potasse is added. The urine is albuminous.	Abcess, ulceration, or merely catarrh of any part of the urinary passages. 1. Pus from the kidneys is usually diffused throughout urine passed. 2. Pus from bladder is mostly mixed with mucus. 3. Pus from an abcess is usually variable in quantity, and not equally diffused.	Those of the cause.	Treat the cause.
Epithelium.	Epithelial cells lining urinary passages. See works on General Anatomy. Often in form of casts.	Kidney disease. Ulceration or catarrh of bladder.	Those of cause.	Treat cause.

Fibrine is sometimes present in the form of flocculi. Or it may form fibrinous casts of the tubuli uriniferi. For information about casts, *vide* medical works on the kidney. Echinococcysts are sometimes found in the urine. Give turpentine in large doses. The following table (p. 86) has been constructed chiefly with the aid of Thompson, Druitt, and Niemeyer. In

cancer of the bladder, cancer-cells and débris are sometimes found in the urine. *See URINE.*

Calculus, Nasal. *See NOSE.*

„ **Renal.** *See NEPHROTOMY, &c.*

Calculi.—There are seven mineral substances of which urinary calculi may be formed. A calculus may consist of

TABLE OF CALCULI.

PHYSICAL CHARACTERS, ETC.		CHEMICAL CHARACTERS
Lithate of Ammonia.	Occurs rarely except in children. Grey, smooth, dusty, non-laminated appearance.	Soluble in boiling water. Add HCl to solution and you get a precipitate of uric acid. Heat with potassium carbonate: ammonia escapes. Blow-pipe burns it away.
Uric Acid.	Smooth or warty. Yellowish or brownish. Concentric structure.	Gives off no ammonia when heated with KHO. Evaporate to dryness with nitric acid. Cool, and add a little NH ₃ ; the characteristic deep purple-red murexide is then obtained. Blow-pipe burns uric acid away.
Oxalate of Lime.	Rough, warty, 'mulberry' appearance. Very hard. Dark 'blood-stained.'	Easily soluble in nitric acid. Boil long in a solution of potassium bicarbonate, neutralise carefully with nitric acid: then white precipitates can be formed with solutions of lime, lead, or silver. Blow-pipe reduces it, first to calcium carbonate, then to quick-lime. Heat on platinum foil and it chars. Then add HNO ₃ , and it effervesces.
Cystic Oxide.	Has a wavy appearance, especially when fractured. Changes colour with age from pale yellow to brown, grey, or green. Extremely rare. Contains sulphur.	Dissolves, in great part, in ammonia: its solution then deposits by spontaneous evaporation, six-sided prismatic and tubular crystals. Dissolve in strong caustic potash. Boil, and add a little solution of lead acetate; a black precipitate of sulphide of lead falls.
Xanthic Oxide.	Section, lustrous bright brown. Most extremely rare.	Has a peculiar deep yellow colour, when its solution in nitric acid is evaporated to dryness; characteristic.
Mixed Phosphates of Lime.	Chalky, soft, brittle, laminated.	'Fusible calculus:' melts in the blow-pipe flame. Dissolve in nitric acid and add excess of ammonia: white precipitate.

several of these materials in layers, or of one only. 1, Lithate of ammonia; 2, lithic or uric acid; 3, oxalate of lime;

4, xanthic or uric oxide ; 5, cystic oxide ; 6, phosphate of lime ; 7, triple phosphate. For the causes of the presence of an abnormal amount of some of these substances in the urine, see Table of Urinary Deposits. The nucleus or centre of each calculus may be formed first in the kidney or in the bladder, or it may be a foreign body. Poverty, certain localities, and the male sex are great predisposing *causes* of stone in the bladder. Negro race remarkably exempt.

Phosphate of lime and triple phosphate very rarely occur separately.

Fibrinous calculi smell of burnt feathers when burnt, and are stained bright yellow by nitric acid.

Uric acid forms the nucleus of most 'alternating' calculi.

The nature of the stone, while still in the bladder, may be guessed at by considering the urine and any deposit from it. The urates are formed from acid, the phosphates from alkaline urine. *Vide* Table of Urinary Deposits.

Symptoms of calculus in the bladder.—(Often so trifling as to attract no attention for a long time.) 1, *Pain* radiating from bladder to perineum and in glans penis, especially after micturition ; 2, *riding* or *jolting* may aggravate the pain by shaking stone about : less pain when prostate is much enlarged ; 3, *urine sometimes suddenly stops flowing* ; 4, *frequent micturition* ; 5, in children, *incontinence* of urine ; 6, *blood* in urine ; 7, *signs of vesical catarrh* ; 8, *prolapsus ani* ; 9, *priapism*. Many of these symptoms are often absent. For physical signs we employ the process called

Sounding.—The sound should have a short, sharply curved beak, and is best hollow. Warm, oil, and introduce. Hold lightly and gently. Push backwards and forwards, and from side to side. Then turn point downwards, to examine base of bladder. The finger in the rectum, or suddenly letting the urine flow through the sound, will sometimes assist. Points to be ascertained : 1, presence or absence of stone ; 2, size ; 3, number ; 4, nature ; 5, whether the stone is encysted or not ; 6, state of bladder as to rugosity. In children (and occasionally in very thin adults) by means of two or more fingers of the left hand in the rectum and the right hand on the abdo-

men, a stone in the bladder can be raised till it rests on the os pubis, where it can be grasped and its size estimated (Volk-mann). Size and number are best found by seizing and measuring with a lithotrite. Nature best judged by considering the urine and the patient's age and constitution. *Fallacies* result from mistaking a fasciculated bladder or the feel of some bony pelvic prominence for a calculus. The stone should be heard as well as felt. Davidson's 'lithophone' greatly facilitates the discovery of small calculi by the sense of hearing (see *Lancet*, November 3, 1883). A stone may be hidden away in a sacculus. It there keeps always in one position, and perhaps is only felt occasionally, or not at all. 'The surgeon should always remember that when irritation at the neck of the bladder arises from stone it is referred to the glans penis; when from disease of the bladder, to the organ itself; and when from disease of the prostate, to the perineum or rectum' (Bryant).

Treatment.—1, Palliative: treat the complications, e.g. vesical catarrh; recumbent position; decoction of *triticum repens*. 2, Operative. As lithotripsy is not yet of any value, refer to articles **LITHOTOMY**, **LITHOTRITY**, and **LITHOLAPAXY**.

CALCULUS IN THE KIDNEY.—*Causes.*—*Vide Table of Urinary Deposits.* *Position.*—They may occur as small deposits in the tubules, or as stones of various sizes, single or multiple, in the pelvis and calyces, often forming a cast of the pelvis and its offsets. *Symptoms and Course.*—Pain in the back; blood, pus, or 'gravel' in urine; sometimes intense pain (renal colic); pyelitis. Sounding by aspirator needle. An exploratory laparotomy sometimes justifiable. *Treatment.*—It has frequently been found practicable and justifiable to cut down upon and remove the stone (see *Nephrotomy*), or even to remove both kidney and calculus (see *Nephrectomy*). For the renal colic, use opium boldly, chloroform, and warm baths.

CALCULUS IN THE PROSTATE.—*Origin:* either descends from bladder, or forms first in prostate. Number, 1 to 100: size, grain of sand to cherry-stone; faceted; colour, various; consistence, various; structure, usually concentric layers; chemistry, phosphate (rarely carbonate) of lime; position, projecting into

or near the urethra usually, but sometimes near circumference of gland, and occasionally even partly in bladder and partly in prostate. *Symptoms*.—Those of irritation, inflammation, or abscess of the prostate, according to their effect; semi-erection of penis, and difficulty in seminal ejaculation. Calculus can possibly be felt by sound in the urethra or finger in rectum. *Treatment*.—Remove if possible by urethral forceps, or operate as for median lithotomy; but it is perhaps best not to operate when the calculi are small, very numerous, or only to be felt per rectum. When operating, see if there be any calculus in the bladder also.

CALCULUS IN THE URETHRA.—Usually descends from bladder, but may be formed *in situ* (then usually behind a stricture). *Symptoms*.—Pain, obstruction, or retention of urine. If not relieved, dilatation of urethra, extravasation, abscess, and urinary fistula, through which stone may pass. *Treatment*.—1, Push forwards with finger and thumb: 2, extract with urethral forceps, wax bougie, or some specially devised instrument, if necessary slitting up meatus urinarius; or, 3, push back stone to posterior part of urethra, and do median lithotomy. If there is not serious obstruction, a little patience will sometimes allow the urine to wash the stone right to the meatus within twenty-four hours. In other cases delay is highly dangerous. If there be much preputial swelling and phimosis, it may be advantageous or necessary to circumcise.

CALCULUS IN FEMALE has, besides many of those of male, these *special symptoms*, viz., 1, bearing-down pains; 2, incontinence of urine. *Diagnose* carefully from uterine disease, by sounding and vaginal examination. *Prognosis*.—Liability to ulceration into vagina, and consequent vesico-vaginal fistula. *Treatment*.—Remove calculus. Three classes of methods, viz., 1, urethral dilatation; 2, lithrotrity; 3, lithotomy. The dilatation is best done with a three-bladed screw dilator. *Vide* also articles **LITHOTOMY** and **LITHOTRITY**. Danger of incontinence if the urethra is dilated too much. The limits of size for dilatation should be a diameter of one to one and a half inch for adults, and half as much for children. (Refer to *Walsingham, St. Barth.'s Hosp. Rep.*, vol. xi.)

Cancer.—The term is frequently used as if synonymous with 'malignant,' and therefore including other new growths besides 'carcinomata.' *Characters of carcinomata.*—They tend to, 1, infiltrate neighbouring tissues; 2, recur; 3, affect lymphatic glands; 4, be followed by secondary deposits; and if the cancer be left long enough, all these four events are pretty sure to take place. Cancers also tend to soften and ulcerate, and 'there is scarcely a tissue or an organ which they may not invade.' *Causes.*—There can be little doubt but that hereditary influence has some, though very little, effect in this, as in the liability to most other diseases.¹ Still the cancer at its origin is probably local, and various local irritations, such as blows, smoking clay pipes, decayed and rough teeth, &c., can often be traced as exciting causes. Soft cancer occurs chiefly in youth, hard cancer in middle age. It is certain that affections at first indistinguishable from chronic inflammations sometimes pass into cancer. An admirably argued and almost convincing paper on the etiology of cancer, which the author believes is bacillary, is to be found, by Dr. R. J. Hall, in the *Annals of Surgery*, vol. ii. 1885, p. 453. Many striking cases and a full 'literature' are given. *Symptoms.*—Those of a new growth differing from an innocent tumour in more or less of the following characters: 1, it tends to infiltrate; 2, to involve neighbouring tissues; 3, to attack neighbouring lymphatic glands; 4, it grows more rapidly than innocent tumours; 5, it is usually more painful; 6, it tends to soften and ulcerate; 7, it has the peculiar features of one of the varieties of cancer. *Prognosis.*—*Vide BREAST, CANCER OF, &c.*—Epithelial cancers kill, on the average, in fifty-three months: scirrhus in thirty-two (Sibley). Soft cancer is still more rapid. Cancer kills by, 1, haemorrhage; 2, interference mechanically with vital organs; 3, general infection of blood and consequent cachexia, &c. *Histology.*—Every cancer consists of cells lying in the interstices of a network of fibrous tissue; the network may be close or open, strong or weak; the cells are of two kinds: one, the larger, are of epithelial origin; the other, the 'small cell formation,' of connective-tissue origin. It may here be mentioned that the cells of a sarcoma are all of

¹ See Cripps, *St. Barth.'s Hosp. Rev.* vol. xiv

connective-tissue origin, and primarily directly connected with the meshwork in which they lie.—*Vide* Special Varieties of Cancer. Cancer-juice is fluid containing cancer-cells and often oil-particles and débris. *Varieties of Cancer*.—Some of the sarcomata, and, indeed, exceptionally, almost any kind of tumour, may have most of the characters of malignancy. In these cases, the characters are usually so modified as to cause a condition spoken of as 'semi-malignant.' There are five varieties of carcinoma—viz. 1, hard; 2, soft; 3, colloid; 4, squamous (ordinary) epithelial; 5, cylindrical epithelial cancer; besides villous, melanotic, and osteoid cancers.

CANCER, HARD. SCIRRUS.—The fibrous part preponderates over the cell-elements. *Pathology*.—Hard, section concave, white or grey, dotted with yellow points; no defined margin; juice. Either tuberous or infiltrating; 'tuberous' means 'forming a distinct nodule.' When infiltrating, the neighbouring parts are hard, adherent, and often drawn in; infiltration of skin with tubercles, a very valuable clinical symptom. Parts of the cancer often atrophy, or even slough. The cancerous ulcer is irregular, fetid, with thick hard edges. *Locality*.—Breast, skin, rectum; found also in testicle, tonsil, eye, &c.

CANCER, SOFT. ENCEPHALOID.—Fibrous parts small; cells abundant; special characters of other varieties absent; not distinct in nature from scirrhus. If a scirrhus be removed, cancer often recurs as encephaloid. Consistence, often as soft as, or even much softer than, brain; colour, white, creamy, or blood-stained. When connected with bone or periosteum, liable to contain bony plates or even a complete bony framework; often contains large blood-cysts; may be encapsulated; soft and fluctuating. Puncture lets out blood and often cancer-juice as well. May ulcerate and fungate as a bleeding mass; grows fast, and is covered by large cutaneous veins, owing to its obstructing deeper veins; large vessels and nerves not generally compressed; amount of pain, variable; 'cancer of young life.' *Locality*.—Bones, female breast, eye, testicle; attacks also uterus, bladder, &c.

CANCER, COLLOID. ALVEOLAR CANCER.—Its carcinomatous nature doubtful; consists of a stroma of wide meshes, with

rounded or oval nuclei ; meshes contain a jelly-like substance, besides cells, some of which have concentric laminæ like an oyster-shell ; to the naked eye this cancer has a marked jelly-like appearance. *Locality.*—Peritoneum, ovary, breast, limbs, parotid, rectum ; in alimentary canal, it is said to arise from Lieberkühn's follicles.

CANCER, SQUAMOUS EPITHELIAL, or ordinary epithelioma.—Least malignant of the carcinomata ; cells flattened like those of epidermis ; tendency to arrange themselves in 'nests.' First appearance, usually a hard lump or wart, which may be dry for a long time, but usually ulcerates sooner or later. Ulcer has hardened, elevated edges, and often an excavated base ; occasionally cauliflower-like ; glands slow to be affected ; infection of the system slower still. *Locality.*—Places where skin and mucous membrane meet, *e.g.* lips, eyelids, anus, &c. ; also warts on the skin, back of hand, front of leg, prepuce (from irritation of soot), tongue. Life usually destroyed by local causes. This cancer should be removed, even if glands are somewhat enlarged. When it is practicable, the enlarged glands should be themselves removed. If an epithelioma be excised early, there is fair hope of non-recurrence. Half the operated cases of epithelioma of the lip recover permanently. If taken in time and done thoroughly, *all* should. Good results claimed from lactic acid applied locally (Mosetig-Moorhof, &c.). See *Annals of Surgery*, 1886, vol. i. p. 230.

CYLINDRICAL EPITHELIAL CANCER occurs in mucous membranes. Both primary and secondary deposits contain cylinders of cylindrical epithelium, like the structure of mucous membrane itself.

VILLOUS CANCER. *Vide DISEASES OF BLADDER.*

OSTEOID CANCER.—Here not only the primary tumour has a skeleton of bone, but bone also appears in the secondary deposits.

MELANOTIC CANCER is simply cancer with deposits of pigment in the cells. Its primary seat is usually a part originally highly pigmented, *e.g.* a dark mole. May be either carcinoma or sarcoma.

Treatment of Cancer.—Constitutional.—Tonics, especially

iron. Anodynes necessary in later states. Diet ample and nutritious. *Local treatment.*—Support and rest when not actively interfering with it ; layer of cotton-wool and bandage ; iodine, opium, and lead retard growth of tumour ; amadou plaster ; for sloughing, a bread poultice with powdered charcoal ; terebene ; wash ulcers with a weak solution of zinc chloride and laudanum ; tepid lotion of chlorate of potash to be used frequently ; lotion of citric acid said to be sedative to epithelial cancers. For oedema of a limb caused by pressure, soft bandages. For haemorrhage, perchloride of iron, or ligature of any bleeding artery, or bathing with water as hot as it can be borne. For pain, extract of belladonna with glycerine locally. Apply to a painful cancerous sore, morphia and glycerine on lint, or iodoform ; chloral or morphia internally. There is a common belief that the pain of pelvic cancers is best relieved by morphia suppositories ; but, from observations made on 50 cases, Champneys concludes that their effect is less than that of morphia given by the mouth, and much less than that of morphia subcutaneously. Question of operating.—Objects of operation—1, to prolong life ; 2, to give an interval of ease and usefulness. Reasons for not operating—1, unhealthy conditions of patient, *e.g.* severe kidney or lung disease ; 2, diffusion and wide infiltration of a cancer ; 3, cancerous cutaneous tubercles ; 4, disease of glands which cannot themselves be removed ; 5, considerable adhesion of a scirrhus breast to pectoral muscle ; 6, more than one tumour (except in rare and chronic cases) ; 7, cancers beneath scalp. If the conditions are favourable, the sooner the cancer is removed the better. It should be removed freely, the neighbouring parts carefully examined, and, in many cases, treated with caustics, *e.g.* zinc chloride (gr. xx. to $\frac{3}{4}$ j.). Suspicious glands should be removed entire. Scissors or écraseur instead of knife in cancer of tongue, neck of uterus, &c. ; galvanic cautery to cancers of skin ; caustics ; Maissonneuve's caustic arrows. Injection of bromine in alcohol (mv. to $\frac{3}{4}$ j.). Extraordinary effects on the growth of cancer are said to have been produced by accidental attacks of erysipselas, and have also been obtained by experimental inoculations. The cancerous

deposits wasted greatly or even disappeared. But, unfortunately, the dangerous character of the remedy has to be reckoned with.

Whenever a cancer *can* be removed, it should be operated on without delay. ““Too late! too late!” is the sentence written but too legibly on three-fourths of the cases of external cancer concerning which the operating surgeon is consulted ; . . . the bitterest reflection of all is, that usually a considerable part of the precious time which has been wasted has been passed under professional observation and illusory treatment.’—Jno. Hutchinson.

Cancrum Oris (or Gangrenous Stomatitis).—A phagedænic ulceration of the cheek in childhood (second to eighth year). *Causes.*—Usually a sequel of one of the exanthemata ; low, damp lodgings, bad air, food, &c. ; mercury to excess in feeble constitutions. *Symptoms.*—Mild form marked by small, grey, sloughy ulcers on inside of cheek, with red gums and foul breath. The typical form presents a slough reaching right through cheek ; skin white, swollen, hard, with a red blush in centre. Internally, a sloughing ulcer, opening into mouth ; offensive odour ; gums swollen and ulcerated. Child suffers little, and dies comatose. Peculiar moving bodies in blood in a case of noma :¹ virulent infectiousness of such blood (Sansom). *Prognosis.*—Of the severe form, only one in twenty recovers. *Treatment.*—Support strength by enemata if necessary ; nitric acid freely to sloughing parts ; chlorate of potash lotion to mouth ; quinine internally.

Carbuncle.—*Causes.*—Occurs chiefly in men over forty-five. Diabetes ; debility. *See also Boils.* *Character.*—Inflammation of skin, and cellular tissue beneath. May begin with a small pustule, but essentially proceeds from a non-circumscribed sloughing of cellular tissue. Brawny, painful swelling ; suppuration ; formation of several openings ; destruction of all affected parts down to subjacent muscles and tendons—then gradual healing and cicatrisation. Constitutional disturbance more or less severe ; blood-poisoning ; sometimes

¹ Noma is a gangrene of the genitals of female children, analogous to *cancrum oris*.

death from pyæmia : less frequently from exhaustion. *Treatment.*—Support strength with tonics and good diet ; fresh air ; crucial incision ? ; subcutaneous incision ; pressure by strapping with plaster ; caustics ; destroy the centre of the carbuncle (about one-fourth its area) by caustic potash ; strong carbolic acid. Paget recommends emplastrum plumbi on leather, with a small hole in the middle, for small carbuncles, and resin cerate under a poultice for larger ones. Danger of hæmorrhage when incisions are made.

CARBUNCLE, FACIAL.—Carbuncle attacking face, especially lips, is particularly dangerous. It is so, possibly, from causing phlebitis, which extends to the cerebral tissues. There is swelling of the cheek and nose, and exophthalmia. Fatal cases may present also symptoms of pyæmia. Prompt incision, and quinine to cinchonism recommended.

Carcinoma. *See CANCER.*

Carotid. *See ANEURISM and ARTERIES.*

Carpus, Dislocation of. *See DISLOCATION.*

Cartilage, Diseases of. *See JOINTS.*

Cartilage, Loose. *See JOINTS.*

Castration.—Required for malignant or other hopeless disease of the testicle. Scalpel ; forceps ; artery-forceps ; extra-strong ligature for cord ; suitable dressings. Shave the parts. Hold testicle in left hand, so as to tighten the scrotum ; incise skin, &c., from external abdominal ring to bottom of scrotum, so as to expose testicle ; pull down the cord, and transfix it with the ligature. In cancer cases, dissect upwards, and tie cord as high up as is safe. Cut cord at least a quarter of an inch below ligature ; the fingers aided by a touch or two of knife then liberate testicle. Secure carefully every bleeding point. Suture, provide for drainage, and dress with iodoform or sero-sublimate gauze-pad, and plenty of antiseptic packing. Fix with a rubber bandage. *Prognosis.*—Operation very safe.

Cataract. *See THE OPHTHALMIC APPENDIX.*

Catheterism. *See STRICTURE OF THE URETHRA.*

Cellulitis. *See ERYSIPelas.*

Cephalhæmatoma.—A blood-extravasation, caused in child-birth. Two kinds : 1, between aponeurosis and pericranium ;

2, between pericranium and skull. Former is diffuse : the latter is circumscribed and small, and never extends across a suture. Treat on general principles.

Cephalhydrocele.—Traumatic cephalhydrocele—the name applied by Professor Conner, of Ohio, to cases in which a fluid tumour forms at the site of a fracture of the skull, with contents of a serous character, possibly cerebro-spinal fluid. Has, so far, been noticed in children only, usually in those under three years old. Considerable absorption of bone around fracture. May be *diagnosed* by the history and by the use of the aspirator. *Prognosis and Treatment.*—If the tumour be protected, things may remain *in statu quo* for years. Interference has generally done harm. (See Conner, *Amer. Journ. Med. Sci.*, July 1884 ; T. Smith, *St. Barth.'s Hosp. Rep.*, vol. xx.)

Cervical Glands. *See GLANDS.*

Chancre. *See SYPHILIS.*

Cheek, Congenital Fissure of.—Extremely rare. Accompanied by imperfect development of external ear. Treat by method used for hare-lip. Sometimes described as 'macrostoma.' Woodcuts in Fergusson's *Practical Surgery*.

Cheloid.—Two kinds : 1, Cheloid of Alibert. A fibrous or fibro-cellular outgrowth from a cicatrix, forming a tubercle, at first pink, afterwards whitish. Tends to disappear spontaneously, especially in youth.¹ *Treatment.*—Excise if hard and unsightly, or following puncture of the lobule of the ear for earrings. Very liable to return. 2, 'True Cheloid' of Addison. 'Not a tumour at all ; but a patch of hidebound skin, in which the skin, fascia, and muscles are adherent together, and the surface is yellowish and covered with scales' (Holmes).

Chest, Injuries of.—Divided into (1) non-penetrating, (2) penetrating. Wounds of the soft parts present nothing special. Rupture of the pectoral muscles sometimes occurs, as, for instance, by a falling man catching at some support in his descent. For Fractures of the Ribs and Sternum, *vide* article **FRACTURES.**

CHEST, PENETRATING WOUNDS OF.—These will be noticed

¹ See *Clin. Soc. Trans.* 1880, p. 61.

according to the parts injured, under the following heads:—1, wound of pleura; 2, wound of lung; 3, hernia of lung; 4, wound of pericardium; 5, wound of heart; 6, wounds of certain blood-vessels. Examinations by probe and finger are not absolutely contra-indicated; but they should not be employed without special indications, and then only with the strictest antiseptic precautions.

1. *Wound of Pleura*.—Rarely occurs without wound of lung. May present all the local symptoms of wound of lung, except that any air expelled from the wound by respiration is not churned up with blood into fine froth. Such air must, of course, have entered the pleural cavity from without the chest. *Treatment*.—As for wound of lung.

2. *Wound of Lung*.—*Signs*.—Escape of air from wound, often churned up with blood into froth; pneumothorax; hæmorthorax; cough; blood and bloody froth coughed up; emphysema. *After-consequences* (both of this and the preceding injury).—Pleurisy; pneumonia; hydrothorax; empyema. *Prognosis*.—Bad, but very far from hopeless. If a week passes over, hope is considerable. *Treatment*.—Perfect rest in bed on injured side; strap chest; dress antiseptically; low diet; give iced milk; avoid stimulants, even to remove collapse. Collapse helps to stop hæmorrhage, which is the first great danger. If pulse rises, or inflammation threatens, bleeding permissible; but not before an attempt has been made to give relief by changing the dressing, relaxing bandage, relieving local tension, &c. The lungs have the power of 'filtering' air (Lister and Tyndall), so that if the external wound be protected from septic influences, the lungs may purify the inspired air. Tyndall showed that expired air looks black in a beam of light, from the absence of organic particles. The air may also be filtered through an antiseptic respirator before it enters the lungs. *Vide also PNEUMOTHORAX, EMPHYSEMA, &c.*

3. *Hernia of Lung*.—Two kinds: 1, primary; 2, consecutive. Consecutive comes on when the wound has healed. Primary should be reduced so long as the lung-tissue is healthy and uninjured. Consecutive can only be guarded by a shield.

4. *Wound of Pericardium*.—*Signs*.—1, A likely position

nd direction of wound ; 2, those of hæmorrhage and shock ; 3, those of pericarditis, viz., friction-sound, extended dulness on percussion, 'thoracic oppression,' dyspnœa, anxiety, &c. Pulse small and frequent. *Prognosis.*—Not absolutely hopeless. *Treatment.*—Cold locally and ice internally ; perfect rest ; venesection ; digitalis and belladonna.

5. *Wound of Heart.*—When death is not instantaneous, the above remarks on wound of pericardium apply to those of heart, only the signs are more severe. Tremor of the heart and disturbance of its action are more marked. When death is instantaneous, patient either leaps up or falls down, often uttering a shriek. A person may live for years even with a small foreign body in his heart.

6. *Wounds of Thoracic Blood-vessels.*—Those of aorta and vena cava usually at once attended by fatal hæmorrhage. *Intercostal and Internal Mammary* arteries. Usually recommended not to attempt ligature, but to trust to rest, cold, &c. Vanzetti's 'uncipression.' But *Surgical History of War of Rebellion* says that these wounds demand 'the rigorous application of the rules for the management of wounded arteries, the exposure of the bleeding point, and a proximal and distal ligature.' In wounds of the chest, with lodgment of foreign bodies, it can rarely be advisable to make any dangerous search for them. Always consider instrument wounding, and direction of wound.

CHEST, VISCERA INJURED WITHOUT EXTERNAL WOUND.—Rare. Signs, treatment, &c., may be inferred from notes above.

Chilblains.—Inflammation of skin owing to sudden change to or from a frosty temperature. Occurs usually in females and children with feeble circulation. Congestive stage and ulcerated or broken stage. Itching. Symptoms aggravated by warmth, dietetic indulgence, and approach of evening. *Treatment.*—Regular and free exercise, fresh air, healthy living, well-fitting boots, straw or cork 'socks' in soles of boots. Locally, in first stage, stimulating liniments, friction with snow, painting with iodine, or solution of sulphate of copper (gr. iij. to $\frac{3}{4}$ j.). In broken stage, use iodoform ointment, collodium flexible or Peruvian balsam. Bathe the part in very hot water. Small doses of

laudanum, frequently repeated, stimulate the capillary circulation.

Chloroform. *Vide ANÆSTHESIA.*

Cholecystectomy.—The gall-bladder has been several times excised successfully by Langenbuch and Thiriar. Cholecystectomy is preferred in this country. Cholecystectomy is a radical cure, as gall-stones seldom or never form in the liver ; but it is more formidable than cholecystotomy. Thiriar ably supports the former operation, and gives a good working description of it in *Rev. de Chirurgie*, 1886.¹

Cholecystotomy.—George Brown tapped the gall-bladder successfully. His example has been followed by others. For table of cases, &c., see Musser & Keen, *American Journ. of Med. Science*, October, 1884. (Abstract in *Annals of Surgery*, January, 1885.) An 'elaborate article' on the surgery of the gall-bladder and bile-ducts by Roth of Amrisweil in *Arch. f. klin. chir.*, 1885.

Chondroma. *See TUMOURS.*

Cicatrices.—Liable to neuralgia, contraction, ulceration, cheloid, epithelial cancers, besides other rarer affections.

CICATRICES, NEURALGIA OF.—May arise from implication of a nerve, or the bulbous end of a nerve in a contracted cicatrix. Separate the cicatrix from the parts beneath, or, if necessary, excise the end of the nerve. If such a cause cannot be found, treat on general principles.

CICATRICES, CONTRACTION OF.—Is a natural process, and results from the escape of water from a new scar as it dries up and atrophies to ordinary connective tissue : most frightful deformities often result. *Treatment.*—1, Preventive ; hasten healing of large wounds by skin-grafting ; prevent suppuration by antiseptic methods ; obviate contraction during and for some time after cicatrisation by splints and bandages. 2, Curative ; divide carefully the contracted bands ; keep the wound stretched during recicatrisation ; graft ; transplant large piece of skin in suitable cases.² When the contraction is merely linear, a V-shaped incision can be made, and when the

¹ See abstract by C. W. Cathcart in *Annals of Surgery*, 1886, vol. ii.

² See 'Skin, Transplantation of.'

tongue of skin thus formed retracts towards its base, the two outer sides of the V-shaped wound should be sewn together at and near the apex of the V. Pressure by strapping will weaken and make thin a thick cicatrix. So also will massage and mechanical extension.

CICATRICES, ULCERATION OF.—Very liable to occur, especially in lower extremities, and in old and feeble people. *Treatment.*—Such cicatrices should be protected from tension, friction and damp. Stimulant applications; rest; good living.

CICATRICES, WARTY (that is, indurated and thickened).—May be blistered or painted with iodine. Do not mistake epithelioma for these.

CICATRICES, CHELOID OF. *Vide CHELOID.*

Circumcision.—Done for phimosis in children and for various diseases of the prepuce and glans penis in adults. With the penis in its natural position, apply a pair of long-bladed polypus-forceps exactly on a level with the corona glandis, but inclined slightly forwards rather than perpendicularly; as the glans slips back, compress the prepuce with the forceps; then slice off prepuce close to the forceps; slit up mucous membrane with scissors right to glans; stitch mucous flaps to skin flaps; check haemorrhage. In infants, instead of sutures, merely wrap a piece of iodoform gauze round behind corona and also over all the parts. Carbolise instruments.

Cirsoid Aneurism. *See ANEURISM.*

Clavicle. *See DISLOCATION, FRACTURES, &c.*

Clitoris, Hypertrophy of.—Occasionally large size; danger of haemorrhage when removing it. Use scissors.

Club-foot.—Four types: 1, talipes varus; 2, talipes valgus; 3, talipes equinus; 4, talipes calcaneus. Talipes equino-varus (a combination of 1 and 3) most common. *Causes.*—The cause of congenital talipes varus, or equino-varus, is usually arrested development.¹ Talipes valgus is only another name for flat-foot; which is sometimes congenital, and sometimes from excessive standing or walking when the foot is predisposed to give way. This predisposition usually occurs during adolescence

¹ For an excellent study of the more remote causes of this, see Parker and Shattock, *Path. Trans.* 1884.

and is probably due to 'rachitis adolescentium.' *See FLAT-FOOT.* Infantile and other paralyses usually lead to equino-varus, because that is the position in which gravity places a foot uncontrolled by healthy muscles. Talipes may be acquired from bad habits of walking, caused by sores or injuries on one or other side of the foot. *See, e.g.,* Clark's case in *Glasgow Med. Journ.* 1882, p. 64. Sometimes the tendons and muscles of a paralysed foot become extremely long and weak. The ankle-joint is then very loose, and the toes can be made to almost touch the shin. This is called 'talipes calcaneus.' A more genuine calcaneus does occur, in which the heel is more or less *fixed* in a downward position. This is a comparatively rare affection, and may be either congenital or due to any of the various causes of contracted joint, *e.g.* paralysis, cicatrix, and prolonged malposition. *Symptoms.*—*Pure varus.*—Very rare; in it, only inner border of foot is raised, and anterior part of foot is bent inwards on posterior half. *Equino-varus.*—In this, the heel is more or less raised; in severe congenital cases the bones are much altered: the dorsum of the cuboid and fifth metatarsal bone sustain the weight of the body. The scaphoid and inner edge of the metatarsus look upwards; the inner malleolus almost touches the scaphoid, and the astragalus is pushed outwards. Fibula lies in a line behind tibia; tuberosity of *os calcis* looks upwards. The tendons contracted in each case will be mentioned under the head of treatment. *Course.*—If left alone, patient learns to walk on deformed foot; callosities form where there is friction or pressure; the leg wastes in paralytic cases and does not develop properly in congenital; the foot and leg thus get the peculiar clubbed appearance. *Treatment.*—Mild cases do not always require tenotomy; use friction, and twist the foot for a quarter of an hour three times a day into its natural position, pulling and fixing foot in position with strapping; strapping combined with splints; shoes, &c., for talipes. The above contrivances used after tenotomy. *Tenotomy.*—For equinus, divide *tendo Achillis*; for equino-varus, *tendo Achillis* after *tibialis posticus* and *anticus* (also *plantar fascia*, and even *inner plantar muscles*). *Valgus* seldom requires tenotomy. *See FLAT-FOOT.* Tenotomy

knives, blunt-pointed and sharp-pointed ; pads of lint ; hot-water can and strapping ; bandage ; splint. Always carbolise your hands, the foot, and the tenotome. See also that the latter is bright and the simple dressing pure—septic diseases can be and have been inoculated by tenotomy. *Tendo Achillis.*

—Position, on face or side. Assistant makes tendon tense ; pass a sharp-pointed knife beneath tendon, one inch from insertion ; place left forefinger over it ; cut gently with sawing motion towards skin ; assistant should relax when he feels that the tendon has gone ; withdraw knife and instantly place finger over wound ; then put on pad instead of finger, strap, bandage, and splint. *Tibialis posticus.*—One inch above inner malleolus. Inner edge of tibia. In fat infants, midway between anterior and posterior borders of leg. Insert sharp tenotome half an inch, so as to open deep fascia. Substitute blunt tenotome ; pass this with one surface towards tibia, and other towards tendon. Assistant meanwhile holds foot inverted. Now foot is inverted, at same time edge of tenotome is turned to tendon. If blanching of foot and much bleeding show wound of post-tibial artery, merely pad and evenly bandage and confidently expect good result. But postpone instrumental treatment for a fortnight. *Tibialis anticus.*—Merely insert tenotome, extend foot and divide tendon from behind forwards. Both tibiales are often more conveniently divided between the malleolus and their insertion. The tibio-scaphoid ligaments can be cut at the same time. *Peronei.*—Sometimes divided for valgus. Divide behind external malleoli or a little higher ; adduct foot. *After-treatment.*—Three or four days after tenotomy, commence to extend by strapping, splints, Scarpa's shoe, elastic bands, or some other mechanical contrivance, according to gravity of case. In infants, extension should be effected in a month. In adults, three or four months may be occupied. At first the instrument should be shaped to fit the deformity : never force a foot into an ill-fitting instrument ; attend daily to the case ; beware of pressure sores ; plaster of Paris bandages may be used instead of movable apparatus. *Process of healing in a divided tendon.*—The divided ends of the tendon retract, and the neighbouring

cellular tissue presses in between them, filling the interspace. In this cellular tissue, corpuscles and lymph (inflammatory new formation) are poured out, which organise into fibrous tissue, uniting and exactly resembling in structure the divided tendon. The process resembles that by which the external callus unites a fractured bone. The advantage of tenotomy is that the new uniting medium is so much more extensible than the original tendon. Many surgeons now put up the foot in plaster of Paris as soon as the tendons have been divided. There are cases of talipes in which every tendon in the foot might be divided in vain, and a life-time spent in fruitless manipulation. For these, there are excision of bone and division of ligaments. It may even be necessary to do a plastic operation to overcome the resistance of the skin. There are many modes of osteotomising for talipes. The two typical operations are (1), excision of a wedge, having the cuboid in or near its base ; and (2), excision of the astragalus (Lund's operation). The former is usually preferred, but there is much to be said in favour of the latter.

Treatment of talipes calcaneus. Leg-irons with a 'front-stop' at ankle, or a posterior rubber accumulator. In the case of paralytic calcaneus, leg-irons stiff at the ankle-joint. This may be combined with resection of the tendo Achillis. But the results of the operation are not of great value. *See TENDO ACHILLIS.*

In paralytic cases of club-foot, the paralysis must not be neglected.

Cocaine. *See ANÆSTHESIA, LOCAL.*

Coccydynia.—A painful affection of coccyx ; female sex ; generally follows an injury, this injury may be received in parturition; comes on when coccygeal muscles are put in action, as by sneezing, coughing, walking, defæcation, &c. *Treatment.*—If obstinate, divide all muscular and ligamentous structures from borders and tip of coccyx.

Colectomy, or excision of a portion of the colon.—An operation still in the experimental stage, therefore no rigid rules can be laid down respecting it. Martini, of Hamburg, who did the first thoroughly authentic and successful case,

opened the abdomen over the tumour, with strict antiseptic precautions, passed a double ligature round the bowel (sigmoid flexure) below the tumour, dividing between the ligatures. The mesocolon was then divided, affected glands removed, vessels tied, and the tumour drawn outside. The bowel was then divided between the tumour and a clamp applied superiorly. As the two cut ends could not be approximated, an artificial anus was formed.

The questions connected with colectomy are well discussed by Marshall (*Lancet*, May 13, 1882).

Collapse. See SHOCK.

Colotomy.—*When required.*—In obstruction of the large intestine, as from stricture of rectum (malignant or otherwise), or imperforate anus; in diseases of rectum or colon, *e.g.* ulceration, or recto-vesical fistula, where it is desirable to prevent the irritation of faeces in the diseased parts. Three operations, viz.: 1, Amussat's in right lumbar region; 2, Amussat's in left lumbar region; Littré's in left groin. The left lumbar operation is sometimes named after Callisen, who merely attempted, but never effected, an operation. *Amussat's in left lumbar region.*—Scalpel, forceps, retractors, director, handled needles, &c.; incision midway between last rib and crest of ilium, transverse or oblique, *i.e.* parallel to nerves; extent, 5 inches: centre at least half an inch posterior to middle point of crest of ilium (Allingham); outer edge of quadratus lumborum thus exposed; now divide, from quadratus outwards, on a director, the muscles to the full extent of the skin wound (*latissimus dorsi, obliquus externus and internus, and transversalis*); secure vessels; distinguish, if possible, *transversalis* fascia from peritoneum; divide fascia; find colon; pass two ligatures through skin at both edges of wound, piercing colon on their way; make opening in bowel enough to admit forefinger; pull out loops of ligatures and divide them, thus making four ligatures: tie each. Oil margins of wound, and place patient in bed. Occasional difficulty in finding bowel, especially when there is not complete obstruction and it is nearly empty. Use of distending injection of air. Bowel must not be sought for too far out from spine; always lies in front of or below kidney,

usually greenish in colour. One of its longitudinal bands may be seen, or lumps of faeces felt.¹ Roll patient on his left side, keeping finger in wound, bowel will sometimes then fall upon finger; not much danger of wounding peritoneum if bowel be distended. Much danger of wounding peritoneum in infants, because descending mesocolon often exists. If peritoneum be wounded, the bowel need not be opened for two or three days, *i.e.* until adhesions have formed. Davies Colley recommends this two-stage operation for ordinary use (*Clin. Soc.*, March 13, 1885). Operation in right lumbar region done in a similar manner. *After-treatment.*—Sedatives at first; dress with oakum; protect edges of wound with zinc ointment: india-rubber bag or plug and soft bandage afterwards; give good diet early; lower part of intestine should, after convalescence, be occasionally washed out with warm water. Tendency to prolapsus. *Prognosis.*—The fatal cases appear to die not so much from operation as from original disease; therefore operation should be done in time. Still a certain proportion, probably at least 10 per cent. (up to A.D. 1881), have died directly of the operation, from erysipelas, peritonitis, &c.

Compression } of Brain. *Vide HEAD, INJURIES OF.*
Concussion }

Condylomata.—*Causes.*—Mostly syphilis, gonorrhœa, and dirt. *Pathology.*—Papilliform, but sarcomatous or made of soft connective tissue in structure; infectious. Syphilitic are flat and moist: gonorrhœal are prominent and warty. *Seat.*—Syphilitic occur about anus, foreskin, prepuce, and mucous membrane of mouth. *Treatment.*—Zinc oxide and calomel for syphilitic; copper sulphate and powdered savin for gonorrhœal; cleanliness, dryness; wear prepuce back.

Contraction, Spastic. *See MUSCLES.*

Contusion. *See BRUISE.*

Coracoid Process. *See FRACTURES.*

Corns.—*Causes.*—Intermittent pressure, or friction from tight or over-loose boots. *Pathology.*—At first a thickening of cuticle, then a bursa forms beneath; afterwards cuticle may

¹ The colotomist should study Braune's observations on the anatomy of colotomy in his 'Topographical Anatomy,' translated by Bellamy.

grow thin while fibrous structures beneath hypertrophy and form base of corn, or the pressure of the thickened cuticle may cause absorption of the parts beneath ; tendency to inflame and suppurate. Resulting lameness may lead to secondary effects. *Treatment.*—Remove cause. Proper boots. Acetic acid, nitrate of silver, alkaline solution, soap, water-dressing, &c., to soften cuticle ; knife to remove it. Sat. solution of salicylic acid in collodion will dissolve corn. Soft corns (*i.e.* those which form beneath the toes) may be also cured by cotton-wool between the toes, dusting with zinc oxide or with French chalk, and by above remedies also. Boots should be broad in sole and straight along inner border. Belladonna plaster.

Coronoid Process of Jaw (and of Ulna). *See* FRACTURES.

Coxalgia.—A term for hip-disease.

Cut-Throat.—Usually suicidal. *Position.*—Generally opposite larynx, which is of course opened, unless the wound be superficial. *Dangers.*—(A, immediate :) 1, hemorrhage ; 2, suffocation by blood-clot ; 3, suffocation by a displaced solid structure ; 4, entrance of air into a divided vein. (B, secondary :) 1, exhaustion ; 2, erysipelas ; 3, abscess ; 4, some form of blood-poisoning ; 5, bronchitis or pneumonia ; 6, secondary haemorrhage, especially such as might be provoked by the patient tearing the wound open afresh. (C, remote :) 1, cicatricial stenosis ; 2, fistula. *Prognosis.*—When a large vessel is wounded, death is usually almost immediate. In other cases the prognosis would be hopeful, but for (it is said) the unfavourable state of body and mind usually co-existing in suicides. *Treatment.*—1, arrest haemorrhage ; tie bleeding vessels ; a small wound in a large vein should be closed by suture, rather than by ligature ; 2, extract clots from air-passages ; 3, if the injured parts cannot be brought into apposition with sutures, and if these sutures will not interfere at all with drainage, use them. When, the wound not being self-inflicted, the patient may be expected to second the surgeon's efforts, buried sutures should be used, the divided parts being united each to its corresponding segment by strong catgut. In most cases sutures are not necessary ; place the bandage round the head and another round the chest, and connect these in such a manner as to hold the

chin down towards the chest ; 4, in cases where the injury is such as to seriously obstruct breathing through larynx, perform tracheotomy ; 5, dress the wound with a mass of iodoform gauze ; 6, the patient must be diligently fed, and if, from wound of the œsophagus or damage to the larynx, swallowing is impossible or difficult, a tube must be passed down the gullet and food passed through it. Be sure not to pass this tube into the trachea by mistake, a blunder easily made ; 7, see that the nursing is diligent, energetic, and vigilant.

Cystitis. *See BLADDER, CATARRH OF.*

Cystotomy. *See LITHOTOMY, and BLADDER, CATARRH OF, and TUMOURS OF.*—The technique of both supra-pubic and perineal cystotomy for tumours is similar to that of the same operations done for removal of calculus.

Cysts. *See TUMOURS.*

Deformities are of many different kinds, and are described elsewhere. *Vide* articles PALATE, CLEFT ; CLUB-FOOT ; CICATRICES, CONTRACTION OF ; JOINT DISEASES ; PARALYSIS, CONGENITAL ; SPINE, CURVATURE OF, &c.

Delirium Tremens, though usually arising directly from prolonged and excessive drinking, is not unfrequently produced by a wound or compound fracture acting as an exciting cause in patients who have not lately been guilty of very great excess. Accessory causes are abstinence from food, and any other depressing influence. *Pathology.*—‘The striking appearance,’ *post mortem*, ‘is that of excessive serosity’ in the ventricles of the brain and between its membranes. *Symptoms.*—Tremor, especially observable in the hands and tongue. Wandering of the mind, usually limited to delusions about certain things, *e.g.* the patient while knowing perfectly well where and with whom he is, yet fancies there is a demon or some noxious animal in the corner of the room, or following him about from place to place. His mind is ever recurring to these fancies, he frequently talks about them and insists upon taking measures to escape from his imaginary enemies : his delirium is a fussy, ‘busy’ one. He is always in a state of dread, and is often inclined to suspect his friends of harbouring designs against him. In his active anxiety to escape from these, he may do

himself or even bystanders some injury. Hands unsteady. Tongue not only tremulous but coated, usually with a creamy fur. Bowels confined. Breath foul, frequently alcoholic. No appetite. Sleeplessness, which has usually existed as a pre-monic symptom before the delirium sets in. *Diagnosis*.—From (1) acute mania, (2) meningitis, (3) delirium of fevers. Note the coolness and moisture of the skin, absence of fever and, very likely, of pain in head. In the continued fevers, prostration has probably preceded the delirium, but thermometric observations and a consideration of the history (which is, unfortunately, not always easy to get) should settle the diagnosis. There is something very characteristic about the manner of the delirium in Delirium Tremens. *Prognosis*.—If sleep can be quickly procured, good. If not, and especially if the tongue gets dry and brown, bad. *Treatment*.—Indications (1) to procure sleep, (2) to keep up the strength. Watchful, firm and gentle, good-natured nursing. Milk, strong beef-tea, and small quantities of nutritious solid food, if it can be borne, at frequent intervals. Stimulants should either be forbidden altogether, or else allowed only in small quantities at a time, and then only on condition that food be taken with each draught. Beer is the best stimulant in these cases. A dose of calomel (5-10 grains) justifiable at first. Morphia subcutaneously. Hydrate of chloral (30 grains) repeated in two hours and then in another three hours. Broadbent has used, with effect, the cold douche to induce sleep. See *Lancet*, March 24, 1882. Digitalis in large doses has been recommended. Mr. Holmes's remarks on treatment of Delirium Tremens in his *Treatise on Surgery* are very clear and instructive.

Deposits, Urinary. *See URINE.*

Dermoid Cysts. *See TUMOURS.*

Diabetes, Traumatic, has followed injury to the brain, and then sometimes passed off as the cerebral injury was recovered from.

Diphtheria is said to attack wounds when a layer of whitish false membrane forms on them and is at the same time accompanied by sloughing. *See HOSPITAL GANGRENE.*

Dislocation.—Three kinds : 1, traumatic ; 2, congenital ;

3, spontaneous. In traumatic, the capsule is almost always ruptured. **COMPLICATED DISLOCATIONS.**—In these there is either fracture, or wound of skin, or of large vessel, or of nerve, or several of these misfortunes.

Causes of dislocations.—1. External force, which is (*a*) direct or (*b*) indirect. 2. Muscular action (*e.g.* usual in dislocation of lower jaw). *Symptoms.*—1. Altered form of joint. Compare two sides of body. 2. Line of direction of misplaced bone does not pass through the articular surface of the other bone. 3. Lengthening or shortening of limb. 4. Altered position of limb to trunk, *e.g.* projection of elbow from side. 5. Abnormal distance between certain prominent points of skeleton, *e.g.* between internal condyle and olecranon. 6. Ecchymosis (rarely distinct at first, sometimes absent). 7. Pain. 8. Inability to move the limb. Manual examination must finally settle the question in most cases, showing the articular cavity empty and the head of the bone at some other point. *Anæsthesia* may be necessary for a diagnosis, because of soft parts being swollen and tender. A soft crepitation sometimes caused by rubbing head of bone on torn capsular ligaments and tendons, partly from the compression of firm coagula. *Diagnosis.*—1. From dislocated articular fracture. Easily made by an attempt at reduction. The latter is readily reduced, but returns at once. 2. From contusion and sprain. Examine carefully. 3. From relaxation of the capsule in paralysed limbs. Here consider the history, and make a careful local examination.

Capsular opening is of variable size. Escaped head of bone does not always remain immediately opposite it. Occasional spontaneous reduction by muscular action.

Mechanical obstructions to reduction.—1. Contraction of muscles. Head of bone may be caught between two contracted muscles. 2. (A far more frequent obstacle) a small capsular opening, or its occlusion by the entrance of the soft parts. 3. Certain tensions of the capsular or strengthening ligaments. *Reduction.*—Easiest immediately after the injury. Later, anæsthesia often required. Manceuvres depend on joint affected. Usually, the assistants make the motions while the surgeon

himself manipulates head of bone. Often everything depends on correct anatomical knowledge. Multiplying pulleys, Bloxam's dislocation-tourniquet : these things now only used under anaesthetics ; when they involve the application of straps round the chest, they make anaesthesia more dangerous. If too great violence is used—1, patient may collapse ; 2, limb may mortify from the pressure ; 3, great vessels or nerves may be ruptured ; 4, rupture of other soft parts, as skin or muscles ; 5, fracture of bone ; 6, limb may be torn off. These accidents occur mostly in attempting to reduce old dislocations. The results of pressure best prevented by fastening the straps over a wet bandage previously applied from below upwards. Nerves and muscles are most liable to rupture when adherent to deep cicatrices. Use of Malgaigne's dynamometer to measure force employed. *After-treatment.*—Reduce synovial inflammation, which always ensues, by moist bandages and cold compresses or ice-bags ; passive motion ; in shoulder, not for a fortnight ; in elbow and hip earlier. Too early motion may cause—

HABITUAL DISLOCATION.—When a joint has been several times dislocated, it becomes extremely liable to dislocation. *Treatment.*—Long rest of the joint.

IRREDUCIBLE DISLOCATION.—Restore the movement as far as possible by passive and active exercise, otherwise the muscles atrophy. The anatomical changes are as follows :—The extravasation is reabsorbed ; the capsule folds together and atrophies ; the soft parts about the misplaced head become infiltrated with plastic lymph, and transform to cicatricial, firm connective tissue, which partly ossifies ; the cartilage metamorphoses into connective tissue, and adheres to the neighbouring parts ; the surrounding muscles suffer considerably from molecular disintegration and fatty metamorphosis. *How long Dislocations are reducible*—Depends on joint. Ball-and-socket much longer than hinge-joints. Shoulders may be reduced after years. Hip, even after two or three months, very difficult. Tenotomy has been employed, but not very successfully ; for the chief obstacle is the firm adhesion of the head of the bone in its new position. Is reduction of such old dislocations de-

sirable ? Often preferable to let patient simply exercise limb well in its new position. Breaking up adhesions about the head of the bone by rotating it forcibly (*vide ANÆSTHESIA*) may facilitate this. Pressure on brachial plexus may require excision of head of humerus. Osteotomy is sometimes indicated when the abnormal position is a bad one, especially when the joint dislocated is the hip or the ankle.

COMPLICATED DISLOCATIONS.—1. With fracture. Always attend to this, and apply an apparatus till it has united, changing it and putting the joint in a new position, say every ten days, to prevent stiffness. 2. With compound fracture. Resect joint, or try to save it, using some thoroughly antiseptic method. If there is considerable crushing and tearing of the soft parts, amputation may be required.

CONGENITAL DISLOCATIONS.—Distinguish from those caused during parturition. Occur in most of the joints of the extremity, but especially in the *hip*. Head of bone above and behind acetabulum. Generally readily replaced. Peculiar wobbling gait. If the dislocation is one-sided, patient, lying on his back, turns the foot inwards. Acetabulum is too shallow, and, in adults, filled with fat. Ligamentum teres, if it exists, is abnormally long. Head of femur too small. Articular cartilage usually completely formed. Capsule very large and relaxed. Cure mostly impossible. *Causes.*—Perhaps excessive quantity of fluid in joint, at very early period of uterine life. Perhaps also extreme adduction in uterine life.

DISLOCATION OF ANKLE.—Four directions : outwards, inwards, backwards, forwards. 1. *Outwards.*—Accompanied by fracture of fibula above outer malleolus and rupture of deltoid ligament or fracture of inner malleolus. Same thing as 'Pott's Fracture.' Foot turned outwards. Depression over fracture of fibula. *Treatment.*—Dupuytren's splint (to inner side), or ordinary leg-splints. Keep foot well in, and sole at right angles to leg. Badly united Pott's Fracture may sometimes be improved by osteotomy above the ankle. 2. *Inwards.*—Accompanied by fracture of inner malleolus. *Treat* on same principle as Pott's Fracture, only keeping foot well out. 3 and 4. Dislocations backwards and forwards may be distinguished

from fracture of leg-bones by relation of malleoli to tarsal bones. After reduction, apply firm apparatus.

COMPOUND DISLOCATION OF ANKLE-JOINT.—May require amputation if tibial arteries be injured, or other important parts be much damaged. Otherwise, remove small fragments, clean, set, and dress. Primary excision of the joint occasionally advisable. Ankylosis pretty certain. Antiseptics.

DISLOCATION OF ASTRAGALUS.—If simple, must be either backwards or forwards. Latter has an inclination either outwards or inwards. Dislocation directly outwards or inwards is always complicated with fracture of leg-bones. Dislocation *forwards* most common. Complete or incomplete. Prominence of head of bone beneath skin in front of ankle. Malleolus of side towards which the bone is inclined projects. Danger of skin sloughing from pressure. *Treatment.*—Flex knee to relax gastrocnemii; extend foot and push astragalus into its place. This is tolerably easy in partial dislocation. But complete dislocation may require anaesthesia and division of tendo Achillis. Dislocation backwards is very rare and difficult to reduce. *Compound dislocation.*—Except in the most favourable cases, reduction is not to be tried. The question lies between excision and amputation. Decide and treat on general principles. In *simple irreducible dislocation*, primary excision is not essential. The bone may remain harmless in its new place.

DISLOCATIONS OF SEPARATE CARPAL BONES, especially of *os magnum*, can be reduced by pressure, and generally require, for some time, apparatus to prevent recurrence.

DISLOCATION OF CLAVICLE.—*At the sternal end*, three varieties—viz., 1, forwards; 2, backwards; 3, upwards. Forwards most common; others very rare. The deformity is in each case so manifest that diagnosis is palpable. In dislocation backwards, end of clavicle presses on trachea, oesophagus, and great vessels of neck. *Treatment.*—Extend shoulders backwards, and bandage to a splint applied to the back with a pad between splint and spine. Difficulty of keeping bone in its place. Truss to press on head of bone displaced forwards. *At the acromial end.*—Dislocation almost always upwards, but sometimes below acromion, or even below coracoid process.

Reduction easy by pulling shoulders backwards. Here also difficult to keep bone in its place. Gutta-percha or leather shoulder-cap, with pad over head of clavicle. Bandage in a line parallel to upper arm over shoulder and elbow. Then bandage arm to side.

I do not believe any appliance will be effective in these cases, unless it take its bearings from the whole trunk, after the manner of a plaster of Paris or poro-plastic corset.

DISLOCATION OF COCCYX may result from falls or during parturition. Reduce with the assistance of a finger in the rectum.

DISLOCATION OF THE ELBOW :—

I. Complete dislocation of radius and ulna : 1, backwards ; 2, forwards—in the former there may be fracture of the coronoid process ; in the latter, fracture of the olecranon ; 3, inwards ; 4, outwards. The latter two are rarely complete.

II. Ulna alone : backwards only.

III. Radius alone : 1, forwards ; 2, backwards ; 3, outwards ; 4, partial forwards.

IV. Ulna backwards, with radius forwards.

Injuries of elbow often obscured by great swelling. Following six excellent directions, as to the points to be noticed in an injury to the elbow, are from Holmes (abbreviated) : 1. Is there transverse fracture of humerus ? 2. Longitudinal or partial fracture of lower end of humerus ? e.g. of condyles. 3. Distance between olecranon and internal condyle ? 4. Fracture of olecranon ? 5. Are motion and position of head of radius normal ? 6. Do axes of radius and ulna correspond in direction ?

Comparison of the two elbows is facilitated by placing patient's two hands together above his head, then approximating as much as possible the two elbows. In this position the relative positions of the two condyles and the olecranon can be compared by the surgeon's eye. On each side they should form a symmetrical triangle, the regularity of which is disturbed by every fracture or dislocation of the elbow-joint, except those confined to the head and neck of the radius. Synovial effusion is easily recognised in this position, producing a fulness around the margin of the olecranon, especially between it and the internal condyle.

Dislocation of both bones backwards.—Prominence of olecranon ; distance between it and internal condyle increased. Prominence of lower end of humerus *below* fold of skin at front of elbow-joint. (In fracture of lower end of humerus, the prominence of the upper fragment is above that fold.) Fracture of coronoid process causes increased mobility, as well as crepitus.

Dislocation of both bones forwards.—Arm is lengthened, and olecranon, unless broken off, is on a level with condyles.

Dislocation of ulna backwards.—Head of radius can be felt normal ; but olecranon is too far back from internal condyle.

Dislocation of radius forwards (most common of the three modes).—Elbow somewhat flexed, and midway between pronation and supination. Further flexion, as well as supination, very limited ; head of radius can be felt displaced. After reduction, very liable to recur, because orbicular ligament is ruptured. Not uncommon in childhood.

Dislocation of radius backwards.—Head of bone can be felt behind external condyle.

Dislocation outwards recognised by manipulation.

Causes.—Falls upon elbow or hand. Half the cases occur in boys.

Reduction of Dislocation of Elbow.—Can often be effected by merely pressing the bones into position. Sometimes extension, and even anaesthesia, required. Dislocations two months old have been reduced, after breaking down adhesions by forcible flexion and extension. In dislocation of the radius. extend from the hand. Bending elbow across knee a useful method of reduction. *Compound Dislocations.*—Excision occasionally necessary, amputation very seldom.

DISLOCATION OF HEAD OF FIBULA.—Extremely rare.

DISLOCATION OF FINGERS.—Are not common, and may be reduced by extension. Amputation should not be done for compound dislocation, unless the finger be hopelessly crushed.

DISLOCATION OF HIP.—Four chief directions : 1, backwards and upwards on dorsum ilii ; 2, backwards into sciatic notch ; 3, downwards into obturator foramen ; 4, inwards on pubes Other varieties, e.g. into perineum, are very rare. First form

is the most frequent. *Causes.*—The backward dislocations take place when a person is in a stooping position, and either falls heavily on his feet, or is struck by a heavy weight falling on his back. Dislocation into the thyroid foramen is caused by sudden and violent abduction, and dislocation on the pubes by sudden and violent extension of the limb, especially if coincident with a blow on the back of the thigh.

Anatomy.—The anterior part of the capsule, including Y-ligament of Bigelow, remains wholly or partially unruptured in all ordinary dislocations, and thus limits the position of the bone, interferes with reduction by extension, and can be utilised in reduction by manipulation. The obturator internus is a strong tendinous muscle; and backward dislocations are on the dorsum ilii, or towards the sciatic notch, according as the head escapes from the acetabulum above or below that muscle respectively. In the lower dislocation, the head of the bone is superficial to the obturator internus. Fracture of the acetabulum not uncommon, especially in dorsal dislocation.

Symptoms.—1. Dislocation on dorsum ilii.—Hip looks widened. Peculiar position of limb; rotation inwards: slight flexion of both hip and knee; axis of thigh intersects lower third of sound thigh; ball of great toe rests on instep or ankle of other foot; heel raised. Abduction and external rotation impossible; stiffness and immobility under chloroform; head of bone makes a prominence in its new position; trochanter is above a line between ant. sup. spine of ilium and tuberosity of ischium (Nelaton's line). Shortening one, two, even three inches. 2. Dislocation in sciatic notch.—Symptoms like those of dorsum ilii dislocation, only less marked. Axis of thigh across opposite knee; ball of toe on ball of other great toe. Shortening, half to one inch. 3. Dislocation into thyroid foramen.—Body bends forwards; foot points slightly outward; a hollowness takes the place of the trochanter. Lengthening, two inches. Head of femur perhaps discoverable in its new position. 4. Dislocation on pubes.—In this and the other rarer forms of upward dislocation, head of bone can be felt in position: flattening of hip; abduction and eversion. Shortening, one inch.

Diagnosis.—Of dislocation on dorsum ilii from impacted fracture of neck of femur with inversion. Under anaesthetics the former shows immobility, the latter mobility. In the former the trochanter is behind, in the latter it tends to lie below the ant. sup. spine of ilium.

Reduction.—Each kind of hip-dislocation can be reduced in two ways, viz. extension and manipulation. Extension method is partly based on the idea that muscular contraction is the chief difficulty. But it is not so. The main resistance proceeds from strong ligaments, and sometimes from too small a hole in the capsule. Hence the advantage of manipulation.

Dislocation on dorsum ilii.—1. Extension.—Apply pulleys just above condyles of femur, and extend knee across lower third of opposite thigh; fix pelvis with perineal band. 2. Manipulation.—Place patient on back, and give anaesthetic completely; grasp knee and foot; flex well both knee and hip, abduct thigh, rotate outwards, and suddenly bring down the limb into a straight line with body. If this fail, try again and again, or rotate inwards instead of outwards.

Dislocation towards sciatic notch.—1. Extension.—Place patient on sound side; apply perineal band and pulleys; flex limb, and draw it across opposite thigh. 2. Manipulation.—Same proceeding as in dislocation on dorsum ilii.

Dislocation into thyroid foramen.—1. Extension.—A pelvic band pulls pelvis towards sound side. A perineal band, working beneath it, is connected with pulleys which extend upwards and outwards from the injured hip. The surgeon grasps the ankle of the dislocated limb, and, dragging inwards, thus prises the femur into the acetabulum. Instead of the pelvic and perineal bands, the bed-post may be placed in the patient's fork, and used as a fulcrum. 2. Manipulation.—Flex hip, abduct slightly, rotate strongly inwards, adduct and straighten.

Dislocation on pubes.—1. Extension.—Extend limb, well abducted, downwards and backwards. At same time, pull head of bone outwards by a towel round thigh just beneath groin. 2. Manipulation.—Pull strongly on thigh in line of axis of femur, at same time bending it on abdomen; rotate inwards, and bring down into a line with body; or employ same manœuvres as in thyroid dislocation.

Old Dislocations.—Reduction is tolerably safe to attempt up to two months. Afterwards, danger of inflammation of joint, or fracture of femur. In some cases sub-trochanteric osteotomy will improve both position and locomotion.

Dislocation with Fracture of Femur.—Try to push head of bone into place, or let bone unite, and then, in sixth week, attempt reduction.

DISLOCATION OF LOWER JAW.—Usually bilateral. *Causes.*—Direct violence, or over-extension in gaping. *Symptoms.*—Bilateral.—Mouth widely open and cannot be shut; saliva dribbles; speech and deglutition almost impossible; depressions where condyles ought to be; prominences behind and beneath malar bones. Unilateral.—Symptoms less marked; chin inclines towards sound side; depression in front of ear only on side dislocated. *Mechanism.*—Two views. One, that it is caused by the coronoid process locking against the malar bones. The second merely attributes it to excessive muscular action.

Prognosis.—If left unreduced, a certain amount of motion returns, and the teeth can be made to nearly, if not quite, meet.

Reduction.—First, disengage condyle by pressing downwards with thumbs, guarded by a towel, in mouth behind last molar teeth. Secondly, push chin backwards and upwards. *Congenital dislocation* is generally accompanied by other signs of imperfect development. *Subluxation* is a kind of 'catching' of the jaw, which the patient can usually remedy for himself. It generally occurs in young people. *General Treatment.*—Tonics and time.

DISLOCATION OF KNEE.—Five kinds: forwards, backwards, inwards, outwards, and dislocation of semilunar cartilage, called 'subluxation.' The first four are unmistakable, from the obvious deformity. The lateral dislocations are most common and not complete. One or other condyle slips over to the opposite half of the tibial surface. Dislocation of the tibia forwards is dangerous from pressure on popliteal vessels by femur. Subluxation is marked by sudden and severe pain attacking joint, which then remains semiflexed. *Reduction.*—Extend and rotate slightly. Compound dislocation, except in favourable cases, requires amputation. Subluxation is reduced

by flexion, followed when the patient is off his guard by sudden extension, combined with slight rotation. Whilst manipulating, press firmly with one thumb on any tender spot.¹

DISLOCATION OF METACARPAL BONES.—Rare, obvious, and reduced by extension.

DISLOCATION OF METATARSUS, if compound, may require amputation.

DISLOCATION OF PATELLA.—Four kinds: outwards (most common), inwards, edgewise, and upwards. *Causes.*—A blow on the edge of the patella, or sudden muscular action. *Signs, &c.*—1, Outwards (most common); patella rests on outer side of external condyle, generally with outer edge raised. 2, Inwards: most rare, almost unknown. 3, Edgewise: either inner or outer edge of patella is twisted into intercondyloid space, the bone standing on its edge. 4, Upwards: Ligamentum patellæ is always ruptured. Quadriceps extensor pulls patella upwards. *Reduction.*—In first two varieties flex thigh on abdomen; press outer or inner edge of patella, according as dislocation is outwards or inwards. The other edge is thus raised and the bone freed, the quadriceps at once pulling it into position. Case 3 often presents great difficulties. *Anæsthesia.* Manipulation. Manipulation combined with bending leg and rotating it on axis of tibia. *Forcible flexion.* Sudden and violent extension made by patient himself. The cause of the difficulty said to be wedging of the superior angle of the bone in the intercondyloid space. Shun any division of tendons or ligaments. If dislocation be irreducible, wait, watch, and act according to the course taken by nature. 4, Upward dislocation: treat like fractured patella.

DISLOCATION OF LOWER ANGLE OF SCAPULA.—Query as to pathology. Slipping of latissimus dorsi or paralysis of serratus magnus. On latter supposition use strychnine endermically (Erichsen); electricity; orthopædic appliances.

¹ For a good paper on subluxation of the knee, see Knott, *Dublin Med. Journ.*, 1882, 'On Hey's Internal Derangement of the Knee-joint.' Annandale has recently cured a case by opening the joint, and fixing the cartilage by sutures. Antiseptic precautions of course. He has also used a similar operation for 'subluxation' of the jaw. The best appliance to wear is one which permits flexion and extension, but not rotation.

DISLOCATION OF SHOULDER-JOINT.—Five kinds: 1, downwards, sub-coracoid; 2, downwards, sub-glenoid; 3, inwards, sub-clavicular; 4, backwards, sub-spinous; 5, upwards. Sub-coracoid is far the most common, sub-spinous very rare. *Causes.*—Predisposing: the natural shallowness and free movements of the joint, previous dislocation, male sex, old age. Exciting: Falls on shoulder, elbow, or hand; muscular action. To produce the dislocation backwards, elbow has to be directed across chest when falling, or else twisted inwards. *Signs.*—Six common signs (Erichsen): 1, flattening of shoulder; 2, hollow under acromion; 3, apparent projection of this process, with tension of the deltoid; 4, presence of head of bone in an abnormal situation; 5, rigidity; 6, pain in shoulder. These resolve themselves into three simply: 1, head of bone is evidently absent from its place beneath acromion; 2, it is present elsewhere; 3, there are such signs as are common to dislocation of all joints, viz., stiffness, pain, &c.

1. *Sub-coracoid.*—Head of bone under or slightly internal to coracoid process. To feel it raise the elbow. Elbow projects from side. Slight lengthening, real or apparent, of upper arm; rarely slight shortening. Stiffness: movement only possible antero-posteriorly.

2. *Sub-glenoid.*—Much like sub-coracoid, but head of bone more distinctly felt in axilla, elbow projects more, and there is lengthening, one inch. Marked symptoms of pressure on axillary vessels and nerves.

3. *Sub-clavicular.*—An extreme degree of 'sub-coracoid.' Prominence of head of bone beneath clavicle. Elbow projects backwards and outwards.

4. *Sub-spinous.*—Head of bone felt beneath spine of scapula. Elbow outwards and forwards.

5. *Upwards.*—Always complicated with fracture of acromion or coracoid. Consequently, injury and swelling likely to be severe. Shortening. Crepitus and deformity.

Anatomy.—In the first three forms the inner and lower part of the capsule is torn, and, if the displacement be great, either the great tuberosity of the humerus, or else some of the muscles attached to it (supra- and infra-spinatus and

teres minor), have to give way. In sub-glenoid, the sub-scapularis also goes. In sub-spinous, also, the sub-scapularis is torn. In sub-spinous, head of bone lies between sub-scapularis and teres minor; in sub-glenoid between sub-scapularis and long head of triceps; in sub-clavicular, on second and third ribs.

Diagnosis.—1. From fracture of neck of humerus. This fracture is never caused by anything but direct violence. Then there are the general differences between fracture and dislocation. Both injuries may occur together. 2. From mere paralysis of deltoid. Then, although there is flattening, still head of bone is easily felt in glenoid cavity.

Reduction.—By heel in axilla; by manipulation; by pulleys; by knee in axilla; by air-pad in axilla; by extension upwards.

Heel in Axilla.—Patient lies on back. Surgeon sits with unbooted heel in injured axilla. Extension either made by himself, or by assistants or pulleys. Anæsthesia. Slight rotation of limb facilitates. Neither anæsthesia nor assistants necessary in most cases. *Manipulation.*—Bring arm with a sweep round in front of chest and face, then rotate inwards whilst bringing the arm down to the side again. This should be done by one hand of the surgeon, while, with the other, he tries to press the head of the humerus into its place. Anæsthesia helps.

Pulleys.—Anæsthesia. Caution: danger of rupturing nerves, axillary artery, &c.¹ Forearm has been torn off. First apply a wet bandage to the arm, then put on a clove-hitch over the bandage, above the elbow. Extension should be slow and patient. Counter-extension by a jack-towel, or by surgeon's heel or knee. *Knee in Axilla.*—Patient sits on a chair. Surgeon places one foot on chair and the knee in axilla. He then seizes the arm, extends a short time, and, lastly, steady-ing the shoulder with left hand, uses the knee as a fulcrum on which to lift humerus into its place. Or, as recommended by Flower in Holmes's system, the surgeon can place his back

¹ Forty-four recorded cases of injury to large axillary vessels during reduction of dislocated shoulder. Not merely excessive force in general, but specially abduction of the arm, circumduction, and rough pressure in the axilla are to be avoided. (See Stimson, *Annals of Surgery*, 1885, vol. ii. p. 382.)

against a door-post and have extension made through the doorway by assistants, whilst he steadies the shoulder with both hands. Mr. Cock placed an air-pad in the axilla, and bound the elbow firmly to the side. In three days the dislocation was found to be reduced. All other attempts had previously failed. J. C. Kelly places the patient supine on a firm couch, stands with his side to the patient, and his hip pressed into the axilla, the arm and hand of the patient closely folded round the surgeon's pelvis. Reduction is then effected by the surgeon's turning round, either forcibly or gently, as the case may require. (See *Dublin Med. Journ.*, vol. lxxiv.) *Extension upwards* can also be made with the heel against the shoulder; or *extension outwards* with counter-extension from opposite wrist. (But see foot-note on preceding page.) Skey has shown that, owing to the great mobility of the scapula, the real direction of the extending force is much the same, whatever it may be apparently.

COMPOUND DISLOCATION OF SHOULDER.—*Complications.*—With fracture of neck of humerus attempt reduction by manipulation, then treat fracture. If reduction impossible, put up fracture, and in sixth week (when union has taken place) again attempt reduction.

DISLOCATION OF THUMB (METACARPO-PHALANGEAL JOINT).—Almost always backwards. *Signs.*—Thumb is bent back. Head of metacarpal can be felt projecting on palmar aspect, and base of first phalanx on dorsal aspect. Main obstacle to reduction is engagement of neck of metacarpal between two heads of flexor brevis pollicis, as in a button-hole. *Reduction.*—The efforts are directed to disengage from flexor brevis pollicis; bend the metacarpal joint of the thumb well into the palm of the hand, thus relaxing the muscle; now press the first phalanx of the thumb well backwards, *i.e.* hyperextend it; at the same time pull the thumb downwards, *i.e.* towards the tips of the fingers; lastly, flex the thumb (every joint) into the palm; if this fails, the pulleys may be tried. Anaesthesia; antiseptic division of one or both heads of flexor brevis, or lateral ligaments; passing a blunt hook through a small incision and hooking tendons of flexor brevis over

head of metacarpal bone. After reduction, keep thumb bent towards palm for a day or two.

DISLOCATION OF WRIST.—Extremely rare; readily reduced. *Diagnosis.*—From Colles's fracture; in fracture the styloid processes go with the hand; in dislocation they approach too near the finger-clefts.

Dissection Wounds.—Under this head we notice the lymphatic and cellular inflammations and blood-poisoning produced by absorption of animal poison from dead bodies. Bodies lately dead much more dangerous than those which have been long dead; bodies dead from erysipelas, peritonitis, puerperal and typhoid fevers especially dangerous. Peritoneal fluid particularly poisonous after death from peritonitis. Not absolutely necessary that there should be a skin-wound. Poison absorbable through hair-follicles or through unbroken skin. *Signs and Prognosis.*—Three grades of severity: in the first the symptoms, except slight fever for a few days, are trivial and almost confined to the limb poisoned; in the second, there is either severe cellulitis in the limb, or abscesses form in parts of the body beyond the limb, or both these troubles may be present. This grade is liable to pass into chronic pyæmia. The third grade is marked by violent and sudden symptoms of septicæmia and often terminates fatally in two or three days. The point of inoculation usually looks angry and purulent, and presents either a vesicle, a pustule, or a scab; it is painful; the lymphatics extending from it to the nearest glands are reddened, tender, and sometimes surrounded by inflamed and even suppurating cellular tissue (phlegmonous erysipelas), these glands are tender and enlarged, and abscesses tend to form around them. Chills, rise of temperature, and other feverish symptoms come on within twenty-four hours. Symptoms such as these are common to almost every case, but the further course is variable. In the third grade of cases, within forty-eight hours, to quote Mr. Callender, 'the patient, flushed, anxious, restless, even delirious, is in a hopeless condition, with prostration and rapid sinking.' In the second grade, there may be extensive cellulitis or the formation of numerous abscesses near glands; but so long as the disease is subacute

or chronic, and provided actual pyæmia does not occur, the prognosis is very hopeful. In these cases the spirits are usually very low. In the first grade, recovery takes place in a week or two, or even a few days. *Treatment*.—If, while dissecting, the hand should be wounded, grasp it so as to check the return of venous blood, wash it, suck the wound, permit it to bleed freely, and let a stream of cold water flow over it. If afterwards signs of local poisoning appear, give the limb complete rest, and the patient a country holiday, with instructions to avoid any kind of exertion, for excitement of the circulation appears to drive poison from the wound inwards. Cauterise the wound ; a hot bath for the limb ; generous diet ; fresh air ; tonics ; purgatives ; rest in bed for the severe cases ; to properly rest, splints are necessary ; mill-board and starch apparatus ; poultices. Open abscesses as they form.¹

Drowning. *See article ASPHYXIA.*

Dura Mater, Fungus of.—A tumour springing from the dura mater, and pressing outwards through the cranium ; simple and malignant forms ; the thinned skull may be felt crackling over the tumour after it has pressed its way through, and the tumour pulsates with the respiratory movements like the brain. Before tumour appears externally there are usually signs of intracranial pressure, *e.g.* diplopia or even convulsions. *Prognosis*.—Eventually fatal, without treatment ; very unpromising with. *Treatment*.—Moderate compression gave relief in some cases. In suitable cases expose tumour by a crucial incision ; enlarge opening in skull if necessary with trephine, and remove tumour from dura mater, if possible. It is next to impossible to diagnose before operating, whether similar tumours spring from the dura mater or from the cranium itself. But, even before the cranium is perforated, there may be phenomena in the case clearly pointing to the

¹ It is likely that the knowledge of the subject in question will be increased by the progress now being made in the study of serpent-venom and its antidotes. Among the products of putrefaction in the cadaver are certain alkaloids called 'ptomaines' by Selmi, the discoverer. They have important points of resemblance to serpent-venom, and are not less deadly. Strange to say, they are even developed in the living body, and have been found in healthy secretions, *e.g.* urine.

locality of the tumour. Then will arise the question of anti-septic trephining, and excision of the tumour.

DURA MATER, IRRITATION OF.—Injuries of the head which cause this produce symptoms such as contractures and convulsions commencing on the *same* side of the body.—See Duret on 'Cerebral Traumatism,' and an abstract by Ferrier, in *Brain*, for 1879. A very severe case of this affection recovered under cold douche.—See *Trans. Clin. Soc.*, 1879, p. 145.

Dysphagia is a symptom arising from obstruction to the oesophagus, *e.g.* by pressure from aneurism, tumours, &c., or from ulcers, cancers, or foreign bodies; sometimes merely spasmodic. *Vide OESOPHAGUS.*

Ear, Diseases and Injuries of.

Eczema.—A superficial inflammation of the skin, with a tendency to spread, and attended by the formation of minute vesicles from which escapes a discharge, usually serous. Three varieties: 1, eczema simplex, or ordinary eczema; 2, eczema impetiginodes, where the secretion is purulent; 3, eczema rubrum, where there is great redness and inflammation. Eczema squamosum is a term applied when the transudation dries quickly. *Causes.*—Three classes: 1, direct irritants, *e.g.* solar and tropical heat, the water cure, mercurial inunction, irritation of parasites; 2, venous obstruction, *e.g.* varicose veins in legs; 3, constitutional causes; sometimes congenital; occasional connection with dyspepsia and disordered menstruation. Scrofulous and rickety children are much disposed to eczema. *Gout.* *Symptoms and Course.*—Skin red and moist, the moisture exuding from minute vesicles. Or, instead of moisture, a branny dryness. *Itching.* Tendency to become chronic and to recur. *Prognosis.*—As a rule, quite amenable to treatment. *Treatment.*—Lin. plumbi c. oleo; ung. zinci; ung. hydrarg. ammoniat.; lotion of hydrarg. perchlor. (gr. ij. ad 3j.) Scabs to be removed by fomenting and poulticing, or by soaking in oil; lotions of carbonate of soda to check discharge. For very extensive eczema with great itching use the shower-bath two or three times a day for ten or fifteen minutes in a warm room. For old cases with thickening of the skin,

soft soap, tar, and caustic potash may be used ; rub the soft soap in twice a day with flannel for three days, then stop, leaving the soap on for three more days, then remove the soap by a bath. A few days after this commence a similar course again, and repeat till a thorough cure is effected. When the eruption is dry and scaly use tar ointment. Danger of tar-poisoning (known by diarrhoea, vomiting, tarry odour of urine and vomit). When soft soap and tar are well borne but do not cure, apply caustic potash (Zj. aquæ Zij.) once a week ; immediately afterwards apply cold wet compresses to relieve the violent pain. For eczema caused by sublimate or carbolic dressings use 'white powder,' *i.e.* bismuth, iodoform, and zinc oxide in equal parts, dredged on, and over it salicylic wool. Constitutional treatment often advisable. Laxatives, arsenic, Donovan's solution, iodide of potassium, in increasing doses. Vigorous local treatment should not be employed in moist eczema of the face or scalp of children, or when the eczema appears to be vicarious for other diseases. The probable cause should never be neglected. In eczema of the legs from varicose veins, prescribe horizontal rest in middle of day, and support from rubber bandages or elastic stockings. Always superintend the use of these bandages at first.

Elbow, Amputation, &c. *See AMPUTATION, &c.*

Elbow, Fracture of. *See FRACTURES (HUMERUS, OLECRANON, &c.)*

Elephantiasis Arabum.—Causes unknown. Occurs in hot countries, especially West Indies and South America ; rare in Europe. *Symptoms.*—Great hypertrophy of skin and subcutaneous areolar tissue of some part of the body. Parts usually affected are lower extremities, scrotum, labia, and face. *Pathology.*—It appears to depend on obstruction of the lymphatics and lymphatic glands. The arteries of the part are usually much enlarged. A micro-organism has been described. *Treatment.*—Ligation of the main artery of the limb has cured some cases, but failed in others.

ELEPHANTIASIS OF SCROTUM. *Vide SCROTUM, DISEASES OF.*

Embolism.—Signifies the conveyance of some solid body, small or large, by the current in a blood-vessel, till it stops

and obstructs some vessel ; this obstructed vessel may be an artery, or a vein, or a capillary, and it may be in the systemic or the pulmonic circulation. The obstructing body is called an *embolus*, and is usually a piece of fibrin washed from one of the cardiac valves, or from the clot in an aneurism, or from an inflamed vein. In regions where the collateral circulation is poor, *e.g.* in the brain, death of the parts whose blood-supply is obstructed by the embolus may occur. When emboli are of a septic nature, they produce pyæmic abscesses. Entozoa have been known to constitute the emboli.

Fatty embolism.—In cases of fracture, and even when a fatty liver has been crushed, the capillaries, of the lungs chiefly, but also of the heart, kidneys, and liver, have been found filled with a fatty material. It seems clear that the emboli, in the case of fracture, come from the medulla of the bones, and probable that they are forced into the veins or lymphatics by a 'vis a tergo.'

The symptoms have some resemblance to those of shock, but do not come on so soon after the injury. They are thus summarised by Jacobson in Holmes's *System*, new edition :— 'Dyspnœa varying in intensity but setting in rapidly ; breathing increased in frequency and varied with deep inspirations ; heart's action irregular, face cyanotic, deepening coma and death. In some cases fat has been passed in the urine.' Artificial respiration has been suggested, to keep the patient alive, till the fat has been got rid of. Minor degrees of fatty embolism are probably not unfrequent after fractures, and are not dangerous.

Emissions, Seminal. *See IMPOTENCE.*

Emphysema.—In surgery, means only the passage of air into the cellular tissue. *Causes*.—Mostly wounds of lung, especially by broken ribs. Very rarely decomposition and consequent production of gas in a wound. The air almost always passes first into the pleural cavity, and is pumped thence by respiratory movements into the cellular tissue. *Symptoms and Course*.—The peculiar crackling feeling is unmistakable and pathognomonic. Unless the air continues to pass into the cellular tissue, it is soon entirely absorbed. The

emphysema is first noticed near the wound, and spreads thence often to great distances. The rupture of an air-cell in the lung may cause emphysema of the mediastina and the neck.

Treatment.—Treat the cause ; put a pad over the wound.

Empyema.—The circumstances which lead to and which indicate the presence of pus in the pleural cavity are described more fully in medical than in surgical works. In the *treatment*, however, the surgeon usually plays an important part.

The operative procedures resorted to may be thus classified :—

1. Aspiration.
2. Repeated tappings with trocar and cannula.
3. Drainage, merely.
4. Drainage, with injection of liquid.
5. Drainage, with injection of air.
6. Antiseptic drainage.
7. Must be noticed the rib resections occasionally done in these cases.

Aspiration, mainly useful as a means of diagnosis. *See ASPIRATION.*

Repeated tappings.—When these are resorted to, steps are usually taken to prevent the ingress of air, such as the use of a special trocar and a tube conducted into a vessel of water. The carbolic spray suffices to prevent the entrance of *septic* air.

Y-tubes and various contrivances, some on the syphon, others on the piston principle, are employed for injecting antiseptic liquids into the pleural cavity.

R. W. Parker advocates, and has contrived an apparatus for, the injection of purified air. It is quite clear that, as the pus flows out of the chest, something must be ready to take its place, and if the chest wall will not fall in, nor the lung dilate sufficiently (as often is the case), purified air would seem likely to serve the purpose admirably (*Brit. Med. Journ.*, June 16, 1883).

Antiseptic Drainage.—The dressings should be large, with plenty of absorptive packing and secured with a rubber bandage.

Caution.—All drainage-tubes used should be so flanged or

moored by long sutures, or specially shaped, that they cannot be sucked into the chest. The surgeon must see to this *himself*.

Position of opening.—The 5th space in the mid-axillary line was the old seat of election. But in later years lower and more posterior points have been recommended. The 7th or 8th space near the inferior angle of the scapula drains the fluid away well, especially if the bed-foot be elevated. Occasionally a counter-opening is made.

Rib resections for empyema.—At first done merely to give better egress to the pus, they have latterly been employed (Estlander, Simon, Peitavy, W. Thomas, &c.) to permit the chest wall to close better to the collapsed or semi-collapsed lung. Small parts of as many as six (!) ribs, and even a large piece of the clavicle, have been removed. The operations are usually done by a longitudinal incision, in the axis of each rib, the periosteum being rasped off and preserved. Bone is soon reproduced ; but in the meantime these operations have frequently attained their object.

Fluids injected in treatment of empyema are usually solutions of pot. permang., carbolic acid, zinc chloride, eucalyptol, thymol, and the like. Such of these as are poisonous must be used weak and with great caution, or perhaps not at all. The subject of surgical treatment of pleural effusions is fully treated by Mr. John Marshall. (*Lancet*, Feb. 25, 1882, *et seq.*)

Enchondroma. *See* TUMOURS.

Epiphyses, Inflammation of. *See* JOINTS.

Epiphyses, Separation of. *See* FRACTURES.

Epispadias. *See* PENIS.

Epistaxis.—Bleeding from the nose. *Causes.*—Congestion of mucous membrane of nose ; this may result from catarrh, from a varicose condition of the nasal veins the result of old catarrh, from congestion of the liver, from heart disease, and even from dyspepsia. Childhood and puberty are the usual ages, but middle life (from liver, heart, or kidney disease, &c.) is also subject. Epistaxis in old age sometimes appears to result from weakness, which it of course aggravates. Blows ; haemorrhagic diathesis ; vicarious menstruation. *Prognosis.*—Dangerous in old and weakly people. *Treatment.*—Perfect rest, coolness, but

extremities should be warm ; bathing face with hot water to diminish congestion of mucous membrane ; sometimes cold water acts better ; raising hands above head ; head not to be held down over a basin ; injections of cold water, of hot water, of tinct. ferri perchlor. Ice to the back of the head ; cold to the spine ; dry cupping between shoulders ; plugging posterior nares. *Operation.*—A piece of whipcord is passed through the nose into the pharynx by means either of Bellocq's sound or of an elastic catheter. It is then pulled from the pharynx into the mouth by forceps, and a plug of compressed sponge or lint tied to that part of the string now hanging out of mouth, but some distance from its end. Plug should be small and nicely shaped, or part of it will irritate back of pharynx or even top of larynx. Now pull the string back through the nose and guide the plug into the posterior nares. Nasal and oral ends of string should be tied together and fixed on face with strapping. When removed plug is to be pulled back through mouth. But string should not be taken away till danger of recurrence seems to be gone.

Epithelioma. *See CANCER.*

Epulis.—A term applied to fibrous, sarcomatous, and cancerous tumours of the gums. Most are fibro-myeloid ; the less of the myeloid structure, the more innocent the growth.

Symptoms.—Non-cancerous epulis ; a fleshy, red tumour of the gum ; teeth loosened, and pushed forward, size variable ; sometimes ulceration. Cancerous epulis has the special marks of malignancy, rapid growth, excavated ulcer, &c. *Prognosis.*

—Neither fibrous nor myeloid epulis usually returns if the bone from which it springs be removed. *Treatment.*—Removal of tumour and attached alveoli with cutting pliers and chisel or small saw.

Erysipelas.—A diffuse inflammation of the skin or subcutaneous areolar tissue, or of both together, almost always attacking the neighbourhood of some wound. Three kinds, viz.: 1, Simple ; 2, Cellulo-cutaneous ; 3, Diffuse cellulitis.

Causes.—Usually a wound which has been exposed to unhealthy influences, e.g. septic virus, draughts of cold air, constant mechanical irritation, certain epidemic influences,

contagion from an adjacent case of erysipelas or puerperal fever. Other causes are bad ventilation, bad and insufficient food, dyspepsia, hospital air when impure, depressed nervous system, want of cleanliness, diabetes, kidney-disease, alcoholism.

Signs.—1. SIMPLE ERYSIPelas. At first rigors, fever, sudden rise of temperature, sometimes to 104°, symptoms of disordered digestive organs, *e.g.* furred tongue, constipation, or diarrhœa. In about twenty-four hours, sometimes later, a rosy redness appears on the tract of skin affected. Margins of redness either well or ill defined. It disappears on pressure. Slight superficial swelling ; when the face or head is affected there is often considerable œdema, especially of eyelids. Progress of fever is irregular, and depends on whether rash spreads or not. Recovery usually takes place in mild cases in a few days, in more severe in a week or so, and is followed by desquamation. Often the adjacent lymphatic glands enlarge before the erysipelas appears. The rash may spread all over body (erysipelas ambulans), or disappear in one place to reappear in another (erysipelas erraticum). These varieties are more serious. Pain is rarely severe.

2. CELLULO-CUTANEOUS ERYSIPelas (Phlegmonous erysipelas).—Constitutional symptoms are as in simple erysipelas, but more severe. Redness deeper. Swelling greater. Within a week the swelling becomes boggy, and next fluctuates, indicating suppuration. Throbbing pain and perhaps a slight subsidence of the symptoms may precede suppuration. Extensive sloughing usually occurs.

3. DIFFUSE CELLULITIS is always preceded by a wound, especially a dissecting wound or the bite of some venomous animal. The skin is not much affected ; but the subcutaneous cellular tissue presents the same œdema, swelling, hardness, bogginess, fluctuation, suppuration, and sloughing as are seen in phlegmonous erysipelas. The constitutional symptoms are severe and usually of an asthenic type. Danger of pyæmia.

Pathology.—All the above forms are related and are primarily inflammations of the lymphatics (lymphangitis), erysipelas simplex affecting only the cutaneous absorbents. So far as experiments on animals go, it appears to be demonstrated

that erysipelas is essentially due to the growth in the affected tissues of a micro-organism. See Koch on 'Traumatic Infectious Diseases.' Fehlheisen, in all the cases he examined (13), found numerous micrococci arranged in chains. He completely succeeded in cultivating these on gelatine, and in inoculation experiments with both the pure and the cultivated micrococcus. The inoculations were made on animals and on man.¹ In the boggy stage of cellulitis and phlegmonous erysipelas, the cellular tissue is distended with effusion, and parts of it are approaching a state of mortification. Sloughing and suppuration almost always follow. Great thickening and stiffness are often left after the deeper varieties of erysipelas.

Diagnosis.—Do not confound the redness and œdema over an abscess beneath deep fascia with erysipelas. Diagnose also from phlebitis.

Prognosis.—Bad when the habits are intemperate, kidney or liver diseased, age old or very young, cause epidemic, form erratic or recurrent, duration prolonged, or if very severe and occurring in the head and face (or neck especially).

Treatment.—Commence with purge (calomel gr. v.-x.). Salines. Tinct. ferri perchlor. (mxx. 4th horis). Diet nourishing but light; avoid loading with more food than is digested. Stimulants recommended by most authorities. Moderate temperature, fresh air, but no draught. Opium not well borne. Local treatment in simple erysipelas, cotton-wool, flour, zinc oxide. Caustics, circumscribing rings of argent. nit. or tinct. iodi of very doubtful benefit. Tinct. iodi painted on. Iodoform colloidion overlapping diseased parts. In the deeper varieties of erysipelas, fluctuating spots should be opened, and tense parts marked with small incisions (2 inches), before they fluctuate. Poultices. If incisions cause obstinate haemorrhage, stuff with aseptic lint or iodoform gauze. At commencement of erysipelas in strong, otherwise healthy, persons, with foul tongues, give an emetic. This sometimes aborts the attack. Elevate position of part affected.

Excision of Joints.—The indications for excision and the conditions of success vary with each joint. Objects of excision

¹ See *Die Aetiolie des Erysipels*, Berlin, 1883, and a Collection of Essays edited by Watson Cheyne for the Sydenham Society.

may be : 1, to merely expedite recovery ; 2, to restore motion to, or rectify malposition in, an ankylosed joint ; or, 3, one of the various purposes for which amputation is done. Hence the choice often lies between excision and amputation.

COMPARISON OF EXCISION AND AMPUTATION.—Life is always to be considered before limb. Excision usually involves a larger wound and somewhat greater strain on the constitution: hence it is of doubtful value in critical cases, where pus has burrowed up and down a limb, leaving open sinuses here and there, and a condition such as would make a thorough process of asepticising next to impossible. But, leaving such cases out of account, antiseptic surgery has abolished the special dangers of excision by doing away with prolonged suppuration and delayed bony union. And even in the case of disorganised joint and septic sinuses above referred to, the limb may often be saved by the proper use of germicides, as detailed elsewhere. Much depends on the particular joint. Excision safer than amputation at shoulder and hip. Danger equal for the two operations at the elbow ; at knee excision is more dangerous than amputation, unless strict antiseptic methods be used, as they ought to be.¹ At elbow and wrist, excision is, of course, especially preferable to amputation, because it leaves the hand. The fact that a resected knee often grows crooked is no argument in favour of amputation. A crooked knee is easily and safely straightened again : a lopped-off limb cannot be reapplied. Excision of ankle is often a good operation. It is sometimes objected to on the ground that disease may return in the tarsal bones. The natural reply to this is that it will be time to cut the foot off when it is diseased.² *Operation.*—Instruments.—knives, forceps, lion-forceps, saws (Butcher's saw, keyhole saw, chain saw, &c.), chisels, gouges, Volkmann's spoon, cutting-

¹ See, e.g., Kocher, *Trans. Inter. Med. Cong.*, vol. i., and Stokes, *Brit. Med. Journ.*, Aug. 12, 1882.

² Too much must not be expected from excision of the hip. The ultimate result is always painted far too *couleur de rose*, especially by surgeons whom I shall venture to term 'resection mad.' This school of surgery is continually turning out into the world cripples who for the rest of their days hobble about on crutches with an unornamental high boot dangling at the end of an almost useless limb. Five patients out of six in whom excision of the hip has been thoroughly done will, if alive, be found, years afterwards, with at least, one crutch, and probably a discharging sinus or two.

pliers, rasping instruments for scraping off periosteum, retractors, directors, excision-director. Esmarch's bandage generally to be used. 1, Make incisions sufficiently free, and parallel to important parts, so as not to divide them ; 2, economise length of bone by use of gouge ; 3, leave epiphysial cartilage in children ; 4, keep periosteum and the capsule of the joint, so far as they are healthy, if a movable joint is desired ; 5, don't confound new bone with diseased bone. The bones should be wired together in certain cases.

PROCESS OF REPAIR AFTER EXCISION.—This is entirely analogous to the process of repair after compound fractures, which, so long as the parts remain aseptic, scarcely, if at all, differs from the process in simple fractures. The prospect of osseous union is inversely in proportion to the quantity of bone excised. *See* the remarks on 'false joint' in the notice of **ANKYLOSIS**.

SPECIAL EXCISIONS :—

ANKLE-JOINT, EXCISION OF.—Disease should be limited to ends of leg-bones and to astragalus. *Operation.*—Incisions two, one internal, along edge of inner malleolus ; the other, external, along posterior border of lower two inches of fibula, around outer malleolus and as far forward on outer side of foot as within one inch of base of fifth metatarsal bone. Saw and nip off inner malleolus through inner incision. Dissect soft parts sufficiently away, pulling peronei tendons backwards and downwards, and keeping close to bone to avoid posterior tibial artery. Cut off outer malleolus ; push tibia out of external wound, and saw off its articular surface. Next remove part or whole of astragalus according to its condition. Dress the wound and keep the limb carefully in good position. *Result.*—Generally good. Sometimes a movable joint. Position of the foot not always perfectly satisfactory.

The above might be termed the 'regular' way of excising the ankle. It is, however, generally sufficient to make only the external incision, then remove the greater part of the external malleolus, take out the whole of the astragalus, and lastly use Volkmann's spoon to any diseased part of the tibia. Iodoform and a thick drainage-tube should be inserted.

ELBOW, EXCISION OF.—In this joint, excision, if practicable, always preferred to amputation. A matter of opinion whether in mere suppurative, synovial disease, the results of excision, of erosion, or of natural cure are the best. *Operation.*—Use a strong knife and ordinary saw. Longitudinal incision 5 inches long, right down to bone, with its centre opposite inner border of olecranon. Then with scalpel separate soft parts from bones, proceeding carefully between olecranon and internal condyle, and guarding ulnar nerve with nail of left thumb. Divide lateral ligaments, push end of humerus out of wound and saw it off freely. Then project ulna and radius, grasp olecranon with lion-forceps, and saw both bones at level of neck of radius. Sometimes orbicular ligament can be preserved with advantage. Some do whole operation subperiosteally, with aid of rasps. Ollier makes an externo-posterior incision, and dissects down between the triceps on the one hand and supinator longus, ext. carpi radialis, and anconeus on the other. He then clears of periosteum, &c., and saws through the humerus, radius, and ulna successively. Subperiosteal resection of doubtful advantage. For complete or partial ankylosis, it will probably be sufficient to remove the lower end of the humerus through an internal incision, after the manner of P. H. Watson (*Edin. Med. Journ.* 1872-3). *Results.*—In good cases, a strong joint with all its natural movements, but when much bone is removed, very possibly a loose 'flail'-like joint. *After-treatment.*—Strictly antiseptic. Hinged splint. One contrived to permit supination and pronation useful. Passive motions after a fortnight.

HIP-JOINT, EXCISION OF.—Indications for operation. See **HIP DISEASE** and **GUNSHOT WOUNDS**. *Operation.*—Incision, free semi-lunar with convexity backwards over posterior border of great trochanter and down to bone. Follow neck of bone to head, open capsule, rasp the periosteum off the bone to be removed, and let assistant, by adducting, rotating inwards and pushing upwards, project head of femur out of wound. Ligamentum teres may have to be divided. Joint very rarely found dislocated. Chain-saw or bone-forceps may be useful. If acetabulum be diseased, remove as much of femur as will

enable you to erase acetabulum. Pelvic fascia separates acetabulum from pelvic cavity. *After-treatment.*—Plaster apparatus; long splints with iron interruption; mere extension by weight and pulley; wire breeches; Thomas's splint. In dressing the wound a stretcher with a hole opposite the hip, like that of Mr. Croft, is useful, but rarely necessary. For heavy adults, when the hip is not aseptic and frequent dressings are required, a stretcher contrived to slip easily, piecemeal, under the patient, and to leave the hips exposed, is advantageous. The stretcher being slipped under the patient, is lifted up and placed with its two ends on two chairs beside the bed. A dressing pan being placed on the floor, the wound can be syringed if necessary, and dressed; while, in the meantime, the bed-sheets are changed or smoothed. *Prognosis.*—Many cases die, but it is difficult to say which perish actually from the operation and which from the disease. Without interference some of the successful cases would have perished of the original disease. See also foot-note, p. 125.

KNEE, EXCISION OF.—*Operation.*—Nearly transverse incision below patella from back of one condyle to back of other, and dividing ligamentum patellæ. Transverse division of the patella and subsequent wire-suture preferable. But it is fair to say that the lig. patellæ can also be sutured. Throw up soft parts from front of lower end of femur. Divide lateral ligaments on the condyles. Retract soft parts and project femur. Saw through condyles below the epiphyseal cartilage in children. Proceed very carefully, both in separating soft parts from back of condyles and in making the last cuts with the saw, or popliteal artery may be wounded. Now push end of tibia upwards and forwards, and saw it off close to articular surface in case of children. Make saw-cuts through the two bones so to correspond that limb may be straight. If they do not fit in this way after first sections, other sections must be made. Treat diseased synovial membrane by excision or erosion. Wire the bones together. Carefully secure all bleeding vessels. Make dependent lateral openings for drainage. In so doing avoid the tendons. *Ollier*,¹ when resecting for injury, makes

¹ See *Lancet*, June 30, 1883; and *Rev. de Chirurgie*, 1883.

a longitudinal incision and saws longitudinally through the patella. When operating for disease, he makes an **H** cut, the transverse being below the patella. *Prognosis*.—No operation shows more clearly the value of Listerism. Ollier, Stokes, and many other surgeons have published significant statements in proof of this. *E.g.*, Ollier, finding that 80 per cent. of these excisions died, forcibly denounced the operation. Now, having adopted strict antiseptic treatment, he finds the mortality in his practice reduced to 1 in 7, which, however, is inferior to the results of other Listerian surgeons. But it is not so much the statistics as the course of individual cases which is conclusive. Instead of half a year's suppuration, we now get complete healing within a month; instead of a septicaemic temperature chart, we see a tracing nearly normal.

In children, excision of the knee-joint is greatly contraindicated by the extent to which it retards the growth of the limb, and because of the success which attends erosion, drainage, and iodoform. *After-treatment*.—Put apparatus on at once. Some fixed contrivance, like P. H. Watson's combination of anterior iron splint with paraffined or plaster-of-Paris'd bandage, the best. Iron back splint with foot-piece and interrupted side splint. Bavarian splint. Salter's swing. Packard's splint. Do not disturb limb for first few days. Recovery and repair are very slow, average eight months, in non-antiseptic cases. Ankylosis should be osseous. In adolescents, an outward bend of the limb is a common misfortune after this excision. This sometimes requires osteotomy.

OS CALCIS, EXCISION OF.—Lines of incision: 1. Along upper border of os calcis from inner side of tendo Achillis to a little in front of calcaneo-cuboid articulation; this should divide the tendo Achillis. 2. Across sole of foot, from anterior end of first incision. Dissarticulate from cuboid first, and from astragalus afterwards. Beware of wounding posterior tibial vessels. *Prognosis* is excellent. A very useful foot results.

SCAPULA, EXCISION OF.—Done for necrosis, caries, and morbid growth. Partial or entire. Crucial or **T**-shaped in-

cision. Haemorrhage occasionally very serious. In removing the entire bone, divide the muscles attached to posterior border at an early stage of the operation, and leave the subscapular vessels till last. Secure the vessels as the operation proceeds.

SHOULDER, EXCISION OF.—Done for gunshot wounds and compound dislocations, and occasionally may be justifiable in cases of bone-disease ; in such cases the cure by natural ankylosis affords a satisfactory result, which is not improved upon by excision. *Operation.*—Incision. Longitudinal from just outside coracoid process downwards and outwards for five inches, right down to bone. Open capsule and divide muscles attached to tubercles of humerus, rotating outwards while cutting internal rotator (sub-scapularis), and *vice versa*. Arm should at same time be brought across chest. Pull tendon of biceps aside. Operator himself now seizes upper arm in his left hand and pushes head of humerus out of wound. Clean soft parts from line of saw-cut. Save periosteum and capsule of joint as much as possible. Saw. If, upon opening the joint, amputation is judged expedient, make a circular incision at the lower end of the longitudinal one, and disarticulate. Excision may be performed with a flap incision, raising the deltoid. Glenoid cavity rarely removed. *Prognosis.*—Very good. Useful limb. Fatality ; of fifty cases, in seventeen the glenoid cavity was interfered with, and in thirty-three the head of the humerus only was touched ; of the seventeen, seven died ; of the thirty-three, only one died. But in military surgery one in four died. These statistics belong to the pre-antiseptic period.¹

TARSAL BONES, EXCISION OF.—See 'Os Calcis, Excision of,' above. Excision of these bones for disease requires a little knowledge of anatomy, and then the surgeon had best be left to adapt his incisions to the particular case. The astragalus may be removed very well by incisions similar to those given for excision of the ankle-joint. Its excision gives excellent results. Excision of the smaller tarsal bones is often by no means a good substitute for amputation. In disease of the general tarsal synovial membrane, a preliminary excision of

¹ See *Lancet*, July 2, 1881.

the middle cuneiform bone may give room to apply erosion to the diseased tissues.

Miculicz's osteoplastic resection of tarsus. Done when the soft tissues of the heel are destroyed or spoilt. The tissues in front of the ankle are left intact, but, posteriorly, everything intervening between the tibia and the scaphoid and cuboid is removed. The tibia and fibula and the scaphoid and cuboid are then refreshed with the saw, and the scaphoid nailed to the tibia.

Excision of *cuboid* for severe talipes equino-varus is easily performed in the following way. Incision, longitudinal from base of fifth metatarsal backwards along outer border of cuboid. Retract edges of wound and also peroneal tendon. Cut the bone out in two or three pieces with a chisel. Mallet generally needless.

WRIST, EXCISION OF.—Lister's method. Its description includes at least twelve directions, besides the application of Esmarch's bandage. 1. Carry first incision (two are required) from as far as dorsum of base of second metacarpal bone upwards to base of styloid process of radius downwards, always internal to extensor secundi internodii pollicis, and continue along outer border of that bone for half its length. 2. On the thumb side of this incision separate the soft parts from the bones, carefully because of *radial artery*. At the same time divide the extensor carpi radialis brevior. 3. Sever trapezium from rest of carpus with cutting pliers. 4. Clean soft parts from bones on ulnar side of incision. 5. Make ulnar incision near anterior edge of ulna, and extending from two inches above styloid process to middle of fifth metacarpal bone. 6. Raise all the soft tissues completely from the dorsal surface of the carpus; then, of course, the two wounds communicate. In doing this the extensor carpi ulnaris should be severed from its insertion. 7. Clean anterior aspect of carpus and ulna, cutting off pisiform bone and hook of unciform bone, so as to leave them attached to the soft parts. Do not go so far forward as to wound *deep palmar arch*. 8. Divide ligaments and remove carpal bones (except trapezium) with forceps. 9. Clean and saw off ends of ulna and radius. All cartilage of radio-ulnar

joint should be removed. 10. Cut off bases of metacarpals so far as they are covered with cartilage. 11. Take away trapezium and base of first metacarpal bone. 12. Cut off cartilage of pisiform and leave the rest, and the hook of the unciform, unless they be diseased. The operation may be shortly summed up thus : The whole carpus (except the pisiform and the hook of the unciform), and also the adjacent cartilage-covered parts of the radius, ulna, and metacarpal bones, are removed piece by piece, in the order found most convenient, through two longitudinal incisions, one ulnar and palmar, the other dorsal and radial. *Result.*—Very useful hand. *After-treatment.*—Very important. Large lump of cork under palm of hand. Flat wood palmar splint. Regular passive motion from the first. Encouragement to active motion.

Exophthalmic goitre. *See BRONCHOCELE.*

Exostosis.—Two kinds of true exostosis, and two allied bony growths. True exostosis is either (1) spongy, or (2) ivory. The allied osseous growths are the 'exercise bones,' and other ossifications of tendons and muscles, besides the 'diffused osseous tumour.' *Causes.*—Usually unknown. Begin in youth, rarely after thirty ; male sex. *Pathology.*—Spongy exostosis consists of cancellous bone covered with a thin layer of hyaline cartilage. The cartilage grows on its superficial surface, and keeps ossifying on its deep surface. Ivory exostosis has the structure of compact bone, but the Haversian canals are smaller, and the lacunæ less regular. Growth slow, and tends to stop, eventually, even without treatment. *Seat.*—Spongy exostosis ; epiphyses of tibia, fibula, humerus, femur, &c. Ivory exostosis : bones of face and skull, pelvis, scapula, and ungual phalanx of great toe. *Character and Symptoms.*—They are recognised by their hard bony feel, their immobility, and their position. The ivory exostosis is especially round, nodulated, and smooth. The neck of the tumour varies in size, and this is an important point in treating hard exostosis. They often cause aching and pain in the limb, and may be serious from pressure on important parts. *Treatment.*—They should be let alone, unless they cause pain or visible deformity, or press upon important parts ; for they often are dangerously

near to joints, may even be covered by a pouch from the articular synovial membrane ; and the hard exostoses of the skull sometimes require great violence to remove them.¹ An incision should be made over the exostosis to be removed, and then saw, chisel, or cutting-pliers applied. It is said that the neck need not be removed. But Stanley writes : 'Absolute security against the reproduction of an exostosis can be obtained only by the removal of every part of its circumference.' If necessary, he adds, the potassa fusa, or nitric acid, may be used to produce exfoliation of the base of the tumour I know of no living surgeon who follows this practice. Diffuse bony tumour may require amputation of a limb or extirpation of an entire bone, and even then it has been known to recur. Nothing can be done for 'exercise-bones.'

Extravasation of Urine.—When extravasation of urine is described as a distinct disease, it usually means that which is caused by the urethra bursting just behind a stricture. Rupture of the urethra from violence may cause similar symptoms. Extravasation into the pelvis, or into the peritoneal cavity, may result from rupture of the bladder, *quod vide*. *Symptoms.*—Patient has a stricture of the urethra with retention. Sudden sensation of relief and, simultaneously, of something giving way in perinæum, succeeded by stinging, burning pain in the part. Then swelling successively of perinæum, scrotum, penis, and hypogastrium. Pain ; fever, which soon assumes a low or 'typhoid' character. Skin of parts affected dusky red or purple. Rapid sloughing wherever the extravasated urine finds its way. *Œdema, emphysema.* The retention itself is sometimes relieved by this accident. *Prognosis.*—In some cases the urine again begins to flow by the urethra, further extravasation ceases, abscesses form, and the sloughs are cast off—the patient recovering. But it is generally considered that, in most cases, operative interference is urgently demanded. Then there is still great danger, first from the acute gangrene, &c., and lastly, from the prolonged suppuration which ensues. The whole of both testicles may be denuded by the sloughing ; but, if the patient survive, the skin will heal and contract over

¹ The 'surgical engine' may be employed.

them. *Anatomy*.—It is almost always the bulbous part of the urethra which gives way. Then the attachment of the deep layer of the superficial fascia to the posterior border of the triangular ligament, to the rami and body of the pubes, and to Poupart's ligaments, prevents any passage of the urine into the thighs, ischio-rectal fossæ, pelvis or buttocks. *Treatment*.—Indications : 1, to relieve the original retention ; 2, to give vent to the sloughs and extravasation ; 3, to support the strength. To relieve the retention, a catheter should be passed, if possible, and left in. The retention is sometimes relieved by the free incision which should be made in the perineum, to give vent to the urine and sloughs. This free incision should always be made. In making it, place the left forefinger in the rectum to protect that structure, and cut upwards in the median line in the direction of the urethra. If the extravasation is considerable, other incisions should be made. Over the incisions place a poultice, sprinkled with some antiseptic. To keep up the strength, give abundant nourishment, tonics, and stimulants. *See also URETHRA, RUPTURE OF.*

Extroversion of Bladder. *See BLADDER.*

Eye Diseases. *See the Ophthalmic Appendix.*

Face, Wounds of.—Bleed freely. Readily heal. Greatest care should be taken to prevent deformities. Replace even hopeless-looking flaps ; hare-lip pins ; horsehair sutures. When deep parts are divided, sew together the segments of the individual structures, each to each, with fine catgut. Not only will this plan prevent depressed cicatrices, but it will sometimes render suture of the skin quite superfluous. Removal of pins and metal sutures early, lest they themselves should cause scars. Injury to parotid ducts or to lachrymal apparatus may cause fistula.

Fatty Embolism. *See EMBOLISM.*

Femoral Hernia. *See HERNIA.*

Fever, Hectic.—The fever which results from and accompanies chronic diseases of an exhausting character. *Causes*.—Any chronic suppurative disease, especially abscesses connected with bone-disease which have opened externally. Empyemata, chronic suppuration of mucous tracts, of compound fractures,

or of diseased joints, &c. *Pathology*.—Probably owing either to the absorption into the blood of the products of inflammation or of disintegration, or to the actual invasion of the blood by micro-organisms. Whatever may be the immediate cause of the symptoms of hectic, they seldom, if ever, occur, except in cases where the local or general presence of bacteria is highly probable. *Symptoms*.—Remittent or intermittent daily. Temperature rises towards afternoon or evening ; red circumscribed flush on cheeks ; tongue dry ; skin dry and hot ; eyes bright ; slight excitement and sleeplessness. This stage is followed nightly by profuse sweats ; towards morning, patient falls asleep ; on awaking he is still bathed in perspiration, but with the fever and high temperature either wholly or comparatively passed away. In the afternoon the same round of symptoms recommences. In the later stages of hectic, the ‘colliquative’ sweats, as they are called, get more and more profuse and exhausting, and the fever often recurs twice a day ; the mouth becomes aphthous and the legs œdematosus. Mental state usually clear throughout ; range of temperature generally between 99° and 102° ; diarrhoea is common. *Prognosis*.—Depends on the cause. *Treatment*.—If possible, remove cause, e.g. remove carious bone ; try to make large abscesses aseptic, give abundant nourishment, but do not overpower the digestion ; quinine in 5-grain doses ; sulphuric acid, iron, opium, strychnine, astringents ; give opium cautiously ; its use is to relieve any coincident pain. Elevate the œdematosus legs ; flannel bandages carefully applied to these limbs ; astringents for the diarrhoea. When hectic arises from the effects of injury of the lungs, treatment similar to that of phthisis may be required, especially removal to a mild, dry, aseptic atmosphere, such as the air of the best marine and mountain health-resorts.

FEVER, INFLAMMATORY (OR SURGICAL).—The fever which usually accompanies inflammations and injuries. No line can yet be marked as separating this fever from septicaemia ; the two conditions seem to pass imperceptibly into one another ; in applying either name to a given case, one considers whether the symptoms and facts point to ‘reaction’ following a perfectly recent injury or operation, or to an absorption of septi-

material, as being the chief direct cause of the phenomena which the case presents. *Causes and Pathology.*—1, The blood being simply heated by passing through an inflamed and consequently heated part ; 2, the blood being poisoned by absorption of some product of inflammation, whether decomposed or not ; 3, obscure influences possibly acting through the nerve-centres. Such, *e.g.*, are tight bandages, sutures, fear, excitement, and ‘hysteria,’ when these seem, as they do occasionally, to send up the temperature and pulse for a day or two, or even longer. The symptoms of inflammatory fever, and perhaps septicæmia, can be produced by injection of pus, putrid liquids, SH², &c., into the blood or cellular tissue of animals. *Symptoms.*—Usually within forty-eight hours, almost always within seven days of an injury, the following symptoms may appear : increase of heat, subjective, and evident also to the thermometer, frequent pulse, chilliness or rigors, furred tongue, sleeplessness, excitement, even slight delirium ; urine high-coloured, deposits urates ; increased urea ; bowels confined. The fever usually lasts a week. Persistence beyond a week suggests some complication, *e.g.* abscess or erysipelas. If a complication cause the symptoms to recur after once disappearing, we have ‘secondary fever.’ *Prognosis.*—No danger from the traumatic fever itself, provided complications do not happen. In children latent tuberculosis readily awakened by surgical fever.—*Paget.* *Treatment.*—See the treatment of wounds and the prophylaxis of septicæmia. Saline refreshing drinks, fresh air, quiet, rest, &c.

Fingers, Deformities of. *See HANDS.*

Fissure. *See ANUS, &c.*

Fistula. *See ANAL FISTULA, LACHRYMAL FISTULA, &c.*

Flat-foot. — *Causes.* — Prolonged standing or excessive walking in certain persons, synovitis of ankle, injury to ankle, gonorrhœal rheumatism of ankle. The persons predisposed are usually said to be of weak and relaxed fibre ; but this is certainly often not the case. When the age at which the deformity occurs, the structures affected, the manner of the affection, and various other circumstances are considered, the similar natures of flat-foot, knock-knee, and lateral curvature of the spine

become apparent ; and the latter affections, as I shall attempt to show in due course, are, in their essential primary nature, dependent upon osseous rather than upon muscular and ligamentous changes. *See KNOCK-KNEE, SPINE, LATERAL CURVATURE OF, and RICKETS.*

A considerable proportion of children are born with the sole of the foot flat, or even convex. If merely flat, sufficient improvement may be expected to take place with time.

Genu valgum causes pes cavus rather than flat-foot, probably from the effort made by a knock-kneed patient to grasp the ground. *Pathology.*—The ligaments which brace up the arch of the instep are sometimes lengthened, the head of the astragalus sinks, and the scaphoid tuberosity projects excessively ; in bad cases the metatarsus is turned more or less outwards, and the outer edge of the foot turned upwards ; ankle bends inwards, hence the name *talipes valgus*. The bones are always more or less altered in shape ; in fact many, if not most, cases are primarily osseous deformities, the ligamentous alterations being secondary. *Treatment.*—Steel spring or india-rubber pad under arch of foot, the former being let into sole of boot ; internal upright bar to support the ankle ; division of peronei occasionally required. Always strengthen general health ; avoid standing ; and exercise systematically flexor muscles. Mr. Willett and myself have restored the strength and freedom from pain in many cases, merely by judicious exercise of the leg muscles (Evans's plan) combined with an india-rubber bandage properly applied to the instep and ankle. But it is very much easier to relieve the pain, &c.—in fact, the symptoms of what is sometimes termed the 'inflammatory stage' of flat-foot—than to cure the deformity. Both may sometimes be benefited by forcibly flexing the foot under ether, and fixing it up in plaster of Paris for six weeks.

Ogston describes an operation by which he brings about ankylosis of the astragalo-scaphoid joint after restoring it to a normal position. (*Med. Soc. of London*, January 14, 1884.) And Stokes has practised another, the essential feature of which is a wedge osteotomy of the neck of the astragalus.

(See *Annals of Surgery*, October 1885, and *Trans. of Irish Acad. of Med.*)

PERFORATING ULCER OF FOOT.—Usually begins beneath a corn, tends to perforate to dorsum of foot, is usually attended by some affection of the nervous system, especially *tabes dorsalis*, and is sometimes very difficult to cure. Treat on general principles. Do not neglect the neurosis. *Vide ULCER and SINUS.*

Fracture, Varieties.—The main peculiarities of fractures are expressed by the terms—*complete, incomplete, simple, compound, impacted*. Complete fractures are classified into *transverse, oblique, longitudinal, dentate, multiple, and comminuted*. Incomplete include *fissure, infraction, splintering, perforation*. The usual name for infraction is *green-stick fracture*. Lastly may be added *separation of an epiphysis*. **Causes.**—Predisposing : 1, an exposed situation, *e.g.* that of *ossa nasi* ; 2, bones of right side break oftener than those of left ; 3, rough occupations of male sex ; 4, adult age—bones of children are soft and less brittle ; 5, rickets ; 6, osteomalacia ; 7, *tabes dorsalis* ; 8, absorption of part of thickness of bone by ulceration or abscess or tumour ; 9, hereditary fragility. Exciting causes are either : 1, direct, or 2, indirect violence, or 3, muscular action. **Symptoms.**—1, Pain ; 2, swelling ; 3, ecchymosis ; 4, crack felt or heard by patient when fracture occurs ; 5, abnormal mobility ; 6, displacement ; 7, crepitus ; 8, loss of function ('paralysis') of the limb ; 9, injury to neighbouring soft parts, *e.g.* compression of brain by fracture of skull. 8 and 9 are classed together as '*rational*' symptoms, the rest being called '*sensual*.' Abnormal mobility is the only pathognomonic sign. One or more of the above list may be absent, *e.g.* an impacted fracture presents neither crepitus nor abnormal mobility. Swelling is due to extravasation of blood at first, and afterwards often to oedema and slight inflammation. Displacements are of several kinds—viz., angular, transverse, longitudinal, and rotatory. In longitudinal displacement the fragments usually overlap and thus cause shortening. In rare cases they are pulled asunder : thus, lengthening, of course, results. A good example of rotatory

displacement is that which causes eversion of the foot in fracture of the neck of the femur. Besides impaction, displacements of the fragments or intervening blood may prevent crepitus. The soft crepitation caused by effusions, especially those into tendinous sheaths, also the grating of certain rheumatic affections, must not be mistaken for crepitus. *Diagnosis* is rarely difficult except when only one of two mutually supporting bones is broken, or when there is impaction. In the former case there is little or no deformity, in the latter no crepitus or increased mobility. Careful measurement, inspection or palpation usually settle the question. *Prognosis*.—Simple fractures, when properly treated, almost always recover without deformity. In some bones, *e.g.* the clavicle, light deformity is to be expected. Compound fractures are liable to numerous serious and sometimes fatal complications. The chief of these are: 1, decomposition in the wound; 2, extensive gangrene of crushed parts; 3, progressive suppuration; 4, accompanying protracted, exhausting fever; 5, erysipelas; 6, septicæmia; 7, pyæmia; 8, tetanus; 9, delirium tremens. Antiseptic methods, when applicable and properly applied, make the prognosis nearly as good in compound as in simple fractures. They reduce or abolish every one of the above enumerated dangers, excepting possibly delirium tremens, but not excepting tetanus. (*See TETANUS.*) The prognosis of a very severe compound fracture may be to a great extent inferred from what will be written about the question of amputation. Occasionally a fracture resists all ordinary means employed to procure union—‘*un-united fracture.*’ ..

UNION IN FRACTURE.—In the first week the surrounding soft parts are found swollen and the seat of inflammatory effusion. More or less blood is extravasated about the fracture and in the medullary cavity at the same point. Amount of escaped blood very variable. During the third week the corpuscles or leucocytes which crowd the effusion, produce either fibrous tissue or cartilage. Later still, soft young bone appears in—1, the medullary cavity: 2, beneath the periosteum; 3, outside the periosteum in the periphery of the

fibrous or cartilaginous swelling round the ends of the bones (which swelling is called 'callus'). A new periosteum forms outside the callus. The bony callus consists entirely of spongy substance. Subsequently the medullary cavity is restored, the excess of new bony uniting material removed, and that which remains gradually becomes compact and hard. When firmly and steadily set and supported, fractures unite directly, new bone only being formed between and not around the fragments. In other words, there is then no 'provisional callus.' Very little callus in flat bones; very little external, but a good deal of internal (*i.e.* inside the spongy spaces), in spongy bones. The new ossification is usually in fibrous tissue in adults, but is preceded by cartilage in children. The cells which are the agents of the process escape from the blood-vessels. Complete ossific union requires a period of one to two months. Restoration of the medullary canal and absorption of the external or provisional callus require four or five months more. Union in compound fractures results from organisation and ossification of granulations which grow from the ends of the bones and from the neighbouring periosteum. The process is essentially the same as that of union of simple fractures. Frequently the ends of the fragments die, and then the sequestra are cast off by the growth beneath them of granulations which absorb the hard parts of the adjacent living bone. If aseptic and not too large, the sequestra themselves are doubtless sometimes absorbed. Granulations possibly dissolve the lime salts of bone by developing lactic acid. Many compound fractures have the external wound healed so rapidly, that they really unite just like simple fractures. A bare piece of bone does not usually begin to granulate till about 8-10th day. In the meantime, it is of a yellow colour. Dead bone is white or grey or blackish. Compound fractures, if they once suppurate, are apt to require for uniting three times as long as simple fractures. The question of the influence which determines the ossification of the callus, namely, whether it is the osteogenetic layer of the old periosteum, or of a newly-formed periosteum, or the medullary issue of the Haversian canals, is not one upon which the

best observers are entirely agreed. I have mainly followed Billroth.

DELAYED UNION AND NON-UNION OF FRACTURES.—Occur naturally in some situations, as in intracapsular fracture of neck of femur, ditto of neck of humerus, fracture of olecranon, and of patella. *Causes.*—Predisposing : 1, bad nutrition ; 2, debility from repeated haemorrhage ; 3, specific disease of blood, *e.g.* scurvy, the continued fevers ; 4, cancerous cachexia ; 5, osteomalacia. Local causes are : 1, too loose apparatus ; 2, too large a gap of bone to fill up, perhaps owing to loss of a large portion ; 3, too early motion. In ununited fracture, as the condition is called, there is usually fibrous union, sometimes a new synovial membrane and actual 'false joint.'

Treatment of Simple Fracture.—Three main indications : 1, reduction or setting ; 2, keeping in proper position till firm union has taken place ; 3, prevention or treatment of complications. *Setting* : extension, counter-extension, manipulation, relaxation of muscles by flexion of joints or by anaesthesia, occasional propriety of dividing tendons. Compound fractures with protrusion may require skin wound to be enlarged or end of projecting fragment to be sawn off. *Apparatus* : Two kinds, 'fixed' and 'movable.' The 'fixed' are such as plaster of Paris, starch bandage, gum and chalk, moulded millboard, gutta-percha, poroplastic, leather, prepared felt, &c. The 'movable' are the ordinary fracture-box, Cline's splints, Liston's splint, M'Intyre's splint, De Morgan's splint, &c. The difference in the two varieties consists in this—the 'fixed' apparatus is moulded specially to the individual case to which it is applied, while the 'movable' splints can be adapted by fitting and padding to various successive cases. Some of the so-called 'fixed' are not less movable than the other class. To all these may be added the inclined plane, extension by weights or elastic bands, support by sand-bags, &c. Great difference of opinion as to relative value of the above apparatus. Many English, and more Continental surgeons apply a solid firm dressing, such as the starched bandage and millboard, as soon as possible after the occurrence of a simple fracture, and after most compound fractures too.

Other English surgeons teach that this is dangerous. In applying such a firm dressing, attend strictly to the following rules : 1, place no bandage next the skin ; 2, line thickly with cotton-wool or wadding ; 3, include the joints both above and below the fracture ; 4, leave the toes or fingers bare, and never fail to examine them carefully twenty-four hours after applying apparatus. Indications for cutting up apparatus wholly or partially are : severe pain anywhere beneath it ; signs of obstructed circulation in toes or fingers, or looseness of the apparatus. Starched bandages tend to loosen and require trimming. In adjusting any fracture apparatus, carefully avoid disturbing fracture. Starched bandage requires twenty-four hours to dry, plaster of Paris takes a quarter of an hour to set ; borax or damp weather will retard, and common salt hasten, setting of latter. Leather and millboard are softened in hot water, poro-plastic by dry heat, before moulding. Starch should be applied with palm of hand after bandage has been put on dry. Leather and gutta-percha are better adapted to angular parts, *e.g.* shoulder, than is millboard ; but gutta-percha is rather dear, and leather very dear. Salter's swing. Cradle to keep off bed-clothes. With the use of a fracture-box or Cline's splints, correct position is obtained by pads of lint or cotton-wool. Itching of skin is removed by cleanliness, olive oil, &c. Severe pain may require morphia subcutaneously ; but it is usually a sign that apparatus requires re-adjusting. Pain should never be neglected.

COMPOUND FRACTURES.—*Special Notes on their Treatment.* Question of amputation. Consider, 1, cause of the fracture (was there much crushing or twisting force ?) ; 2, main arteries or veins torn ? ; 3, amount of haemorrhage ; 4, condition as to collapse, or reaction ; 5, age of patient ; 6, is it upper or lower limb ? More 'vitality' in former and less danger in the event of gangrene. Depth and extent of bone-injury should also be considered, although no amount of bone-communition by itself justifies amputation. The state of the main vessels, and even of the skin, is of far more consequence than that of the bones and muscles. Injury to nerves, even large ones, not of much account. Rupture of large artery not an absolute

indication for amputation. Will the limb be useful, even if patient does recover, or will it be in the way?

Always treat the wound in a compound fracture very gently. Dress the wounds, using very strict antiseptic precautions. After first dressing and cleaning, never probe or touch it if possible till the wound is quite fistulous. Then, if necrosis is found, treat it like necrosis from osteitis. A firm, starched or plastered bandage should generally be applied as soon as possible after accident. It should be thickly lined with cotton wadding. Extensive discharge or large wounds may require a fracture-box, interrupted or not. Generally, windows in a plaster-bandage suffice. Attend to complications as they arise. The greatest pains should be taken to thoroughly disinfect at the first dressing. Usually a syringing with carbolic lotion (1-20) suffices ; but this must be thorough, including the distension of every space torn open between the muscles, &c. When a long time has elapsed between the accident and the dressing, and especially when the wound is extensive, it may be wise to use a solution of zinc chloride (gr. x.- $\frac{2}{3}$ j.). Or liq. hydrarg. perchlor. (P.B.) may be employed. See carefully that there shall be no obstruction to drainage, but, unless the skin wound is sewn up, or the crushing very severe, it is often unnecessary to use a drainage-tube. Indeed everything is to be avoided which may cause the necessity for a single additional change of dressing, and which may delay the healing of the skin wound. For these reasons, drainage-tubes are seldom used after osteotomy, which is an artificial compound fracture. But a surgeon who is in doubt had better use drainage-tubes too much than too little. Muscles, tendons, and fasciæ sometimes can be advantageously adjusted by sutures. Iodoform is very useful and reliable in the antiseptic treatment of compound fractures.

Treatment of Ununited Fracture.—1, Rubbing fragments together ; 2, blisters or iodine externally ; 3, firing neighbouring skin ; 4, acupuncture needles left for a few days in the false joint ; 5, electro-puncture ; 6, seton ; 7, scraping ends of fragments with a tenotomy knife ; 8, excision of ends of fragments ; 9, scraping back periosteum and then excising ; 10, wiring ;

11, driving in ivory pegs ; 12, metal screws. In many cases, the prolonged application and skilful management of a plaster bandage are sufficient. Attend to general health. Give phosphates. Of the operative proceedings, wiring is the best. The parts should be exposed by a longitudinal incision, the ends freshened with gouge or chisel, drilled and sutured. *See PATELLA, FRACTURE OF*, p. 157.

Fractures united with Deformity.—*Treatment.*—If there is union with malposition in a compound fracture, and the wound is not aseptic and yet is healing rapidly, do not try to rectify till the wound is healed. Remedies for mal-union are bandaging, extension by weights, manipulation, re-breaking (by flexion or extension), cutting operations. *See OSTEOCLASIS and OSTEOOTOMY.*

SPECIAL FRACTURES.—*Acetabulum, Fracture of.*—*Causes.*—Great violence applied to femur. *Varieties.*—Two. *Firstly*, fracture of rim of acetabulum : crepitus, dislocation of femur, probably easy to reduce, but very difficult to keep in position. *Secondly*, fracture through bottom of acetabulum. Head of femur may be driven through acetabulum into pelvis, and even impacted. And there are, very likely, severe injuries to neighbouring parts. *Treatment.*—Extension ; rest ; double splint, long splint, weight, or fixed apparatus. *Prognosis.*—Shortening of limb may be expected.

Acromion, Fracture of.—*Signs.*—Flattening of shoulder ; inability, entire or partial, to raise arm ; crepitus ; arm feels to patient as if dropping off ; the fragments can be felt separated. *Prognosis.*—Union is not unlikely to be ligamentous. *Treatment.*—Support elbow well, so as to make use of head of humerus for a splint. Fix the arm as firmly as can be done without binding it too closely to the side.

Clavicle, Fracture of.—*Causes.*—Almost always indirect violence, e.g. falls on shoulder. *Situation.*—1 (most common), great concavity ; 2, acromial end, between or external to coracoclavicular ligaments ; 3, sternal end (inside rhomboid ligament very rare). *Character.*—Oblique, when from indirect violence in adults ; transverse in children ; transverse or comminuted from direct violence. *Displacement.*—1, Fracture in middle of

bone—outer fragment downwards and inwards beneath inner fragment, the acromial end being rotated forwards ; 2, fracture of acromial end outside coraco-acromial ligaments—outer fragment strongly forwards, inwards, and slightly downwards. Fracture between conoid and trapezoid ; deformity almost *nil*, or else as in last variety (Gordon) ; 3, fracture of sternal end inside rhomboid ligament—outer fragment horizontally forwards, simulating dislocation.

Additional symptoms.—Flattening of shoulder, prominence of inner fragment, crepitus, inability to raise arm, tenderness. *Complications.*—Occasional injury to subclavian vein or brachial plexus. *Treatment.*—Three indications : 1, keep shoulder and scapular fragment outwards ; 2, correct the rotation forwards of the shoulder ; 3, elevate shoulders. Best results from recumbent, supine position, for two or three weeks. Bandages, pads, plaster of Paris. Many special apparatus. Langenbuch has 'wired' antiseptically 'with perfect result.'

For an able study of the mechanism of these fractures, see E. H. Bennett, *Annals of Surgery*, No. 4, 1885.

Coccyx, Fracture of.—*Causes.*—Parturition, falls and blows. *Treatment.*—Regulate bowels. Rest.

Colles' Fracture. See FRACTURE OF RADIUS.

Coracoid Process, Fracture of.—*Causes.*—Blows ; dislocation of humerus. *Prognosis.*—Ligamentous union to be expected, it is said. *Treatment.*—Rest. Biceps and coracobrachialis to be relaxed by flexing elbow and bringing arm across front of chest. Uncomplicated fracture of coracoid process is extremely rare.

Facial Bones, Fracture of.—*Cause.*—Direct violence. *Prognosis.*—Almost equally good in both compound and simple fractures. Great deformity sometimes unavoidable. *Treatment.*—See FRACTURE OF NASAL BONES, &c.

Femur, Fracture of.—Three main divisions : 1, of upper extremity ; 2, of shaft ; 3, of lower extremity. 1. Fracture of upper extremity, three subdivisions—viz., *a*, intracapsular fracture of neck of femur ; *b*, extracapsular fracture of neck of femur ; *c*, fracture of the trochanters not involving the neck.

Fracture, Intracapsular, of Neck of Femur.—Fracture alto-

gether within capsule of hip-joint. *Causes*.—Predisposing—old age, consequent senile atrophy and lessened obliquity of neck of femur. Exciting cause, very trifling, *e.g.* slight fall, or even turning in bed. Almost all intracapsular fractures occur in old age. More common in female sex. *Signs*.—1, loss of power ; limbs cannot be raised from the bed (except in rare cases) ; 2, flattening in region of trochanter ; 3, trochanter rises above Nélaton's line ; 4, it moves, on rotation, in an arc of a circle smaller than on the sound side ; 5, crepitus ; 6, tenderness ; 7, eversion (except in rare cases) ; 8, shortening, $\frac{1}{2}$ to 1 inch at first, later on, owing to capsule giving way, sometimes $2\frac{1}{2}$ inches.

Union.—By fibrous tissues. Sometimes *nil*, rarely osseous.

Diagnosis.—See EXTRA-CAPSULAR FRACTURE. *Prognosis*.—The unavoidable confinement to bed in some cases depresses the system fatally. In any case lameness and shortening are to be expected. *Treatment*.—Bed for two or three weeks. Pillows beneath knee. Then leather or poro-plastic or plaster of Paris or Thomas's splint or Bishop's combination of the two (*see HIP DISEASE*) to hip ; crutches and gentle attempts to use. In strong constitutions attempt to obtain firmer union by longer rest and earlier use of 'fixed' apparatus. Good diet. Water-bed when bed-sores are feared.

Fracture, Extracapsular, of Neck of Femur.—Two kinds : 1, *Simple* ; 2, *Impacted*. Fracture wholly or partially outside capsule of joint. *Cause*.—Direct and considerable violence. *Signs*.—Firstly, when not impacted—1, inability to raise limb ; 2, bruising and swelling of hip, indicating great extravasation ; 3, crepitus at great trochanter, which may sometimes be distinctly felt to be in several pieces ; 4, great pain and tenderness ; 5, usually very marked eversion, sometimes inversion ; 6, shortening, $1\frac{1}{4}$ to $2\frac{1}{2}$ or even $3\frac{1}{2}$ inches. Secondly, *impacted* fracture. *Symptoms* less marked than if there is no impaction. Less eversion ; little or no crepitus, only slight shortening, not more than an inch. But there is local tenderness, followed in a day or two by thickening over great trochanter. *Treatment*.—Extracapsular fracture is to be treated on similar principles to those applied in treatment of fractured shaft of femur. Seek for union by securing immobility.

Fracture of Trochanter Major.—*Signs.*—Local pain, tenderness, crepitus, eversion, no shortening. Fracture of this, without fracture of neck or shaft of femur almost unknown.

Fracture of Shaft of Femur.—Classified according to position, whether in upper, middle, or lower third. *Signs.*—Typical signs of fracture. *Displacement.*—In upper and middle thirds, the upper fragment inclines forwards and usually outwards, lower fragment inclines inwards and is rotated outwards. Causes of the displacement are : 1, lower fragment forces upper fragment outwards at time of accident ; 2, muscular action of psoas, iliacus, adductors, &c. *Treatment.*—1, position merely ; 2, Liston's splint ; 3, double inclined plane ; 4, extension by a weight ; 5, anterior splint ; 6, double splint ; 7, starched bandage or other fixed apparatus. 1. *Position.*—Lay limb on outer side, with knee bent. In infants, merely lay limb straight out in bed, taking weight of clothes off with a cradle (preserve body-warmth in latter case). 2. Liston's splint.—Length, it should reach from a hand's length below heel to a hand's breadth below axilla. Pad ankle well. Turn bandage twice round ankle and instep, then fix foot to splint. Avoid crushing the small toes. Bandage to just above knee with figures of eight. 'Kettle-holder' on inner aspect of thigh. Perineal band. Extension and setting. Apparatus for combining Liston's splint with continuous extension by elastic bands or by weight and pulleys. Sand-bags. Bottom of bed should be flat. 3. Double inclined plane. 4. Extension by weight.—Stirrup of wood and plaster. Strapping extending up to knee. Bandage over strapping. Raise foot of bed on blocks. Weight consists usually of sand-bags or tins of shot, 5 to 10 lbs. 5. Anterior iron splint.—May be combined with a plaster splint. 6. Double splint. Its advantages by no means so clear in fractured thigh as in diseased hip. 'Fixed' apparatus. Plaster of Paris, starch bandage, &c. Unless attended to with great vigilance, liable to have very bad results in fractured thigh. The hip should be thoroughly fixed—not an easy matter. The number of apparatus for treating fractured thigh is continually increasing. The relative values of the old are anything but settled, and the new are generally not very important modifi-

cations of their predecessors. *Fracture of Femur, lower third*, that is, near knee-joint. Upper end of lower fragment projects backwards. Hence these cases should be treated with the knee semi-flexed.¹

Fibula, Fracture of.—Tibia acts as a splint, making diagnosis difficult. Seek for crepitus and increased mobility by pressing fibula at different points against the tibia. Occurrence frequent. *Treatment*.—Cline's (side) splints, or some immovable apparatus. Fracture of fibula about two or three inches above ankle, with rupture of internal lateral ligament and dislocation of foot outwards is called 'Pott's Fracture.' See DISLOCATION OF ANKLE.

Fracture of Forearm may be of radius or ulna separately, or of both bones. See FRACTURE OF RADIUS, ULNA, &c.

Humerus, Fracture of.—9 chief varieties, viz.: 4 of the upper end, 1 of the shaft, and 4 of the lower end.

Intracapsular of Neck of Humerus (anatomical neck of course).—*Cause*.—Direct violence. *Signs*.—Those of a severe injury to the shoulder-joint, causing paralysis, swelling, &c., but very little shortening ($\frac{1}{3}$ -inch) or deformity. Indeed, this fracture is diagnosed by the absence of the marked symptoms of other fractures and of dislocation. Often *impacted*. When not impacted, there is crepitus. *Prognosis*.—Expect bony union, with very likely excess of new bone. *Treatment*.—Pad in axilla, leather shoulder-cap, bandage, and sling. Whole arm should be bandaged gently and evenly. Sling should support hand rather than elbow in all fractures of humerus. Impacted fractures not to be disturbed.

Extracapsular Fracture of Neck of Humerus, i.e. through *surgical neck*. *Signs*.—Sharp end of lower fragment projects into axilla or beneath coracoid. But head of humerus remains in glenoid cavity. Distinct crepitus. Shortening—about an inch. Pain from irritation of brachial plexus. *Prognosis*.—In rare cases the bone atrophies. *Treatment*.—Bandage limb from fingers upwards. Pad in axilla. Carry elbow forward and inwards. Apply a leather cap to shoulder and outer side

¹ A comprehensive account of fractures of the lower extremity, by Henry Morris, is in vol. i. of Holmes's *Surgery*. New edition.

of upper arm. Support hand but not elbow with a sling. Erichsen's bent leather splint.

Separation of Upper Epiphysis of Humerus resembles accident last described, but the upper end of the shaft forms a remarkable and smooth projection beneath the coracoid process. The patient is usually very young, and must be less than twenty. *Treat* like fracture of surgical neck.

Fracture of Great Tuberosity.—*Cause.*—Direct violence. *Signs.*—Increased breadth of shoulder. The tuberosity is dragged backwards by the muscles inserted into it, and the head of the humerus forwards beneath the coracoid (a semi-dislocation) by the pectoralis major, &c. Crepitus. *Treatment.* Pad in axilla and leather cap on shoulders, or rest in bed with the arm extended.

Fracture of Shaft of Humerus.—*Causes.*—Direct violence, falls upon the elbow, and, not rarely as compared with other bones, muscular action. *Signs.*—Typical. *Treatment.*—Two or three splints, one being an angular elbow-splint. Support hand but not elbow in a sling. Stromeyer's cushion for compound fracture of humerus. *Vide* Bryant's *Surgery*, 1st ed., p. 942. Danger of delayed union in fracture of shaft of humerus.

Fracture of Lower End of Humerus.—4 kinds:—1, Transverse fracture; 2, fracture of either condyle; 3, fracture between the condyles into the joint (this is always combined with transverse fracture); 4, separation of the epiphysis. *Causes.*—Usually, falls on the bent elbow. *Signs.*—1, of *transverse fracture*. It may be either above or below the condyles. The symptoms are given in the following diagnosis between it and the injury with which it is most frequently confounded, viz., dislocation of radius and ulna backwards.

THE FRACTURE.

1. Crepitus.
2. Easily reduced, but deformity at once reappears.
3. Prominence of lower end of upper fragment of humerus projects forward *above* the bend of the skin in front of the elbow-joint.
4. Internal condyle in normal relation to olecranon.

THE DISLOCATION.

1. No crepitus.
2. Not so easily reduced. But then does not reappear.
3. Prominence of lower articular surface of humerus projects forward *beneath* the bend of the skin in front of the elbow-joint.
4. Distance increased between Internal condyle and olecranon.

2. *Signs of fracture of condyles.* Pain. Swelling. Crepitus produced by direct manipulation, and by pronation and supination of forearm.

3. *Signs of fracture between condyles into joints.* Pain. Crepitus. Effusion into joint perhaps considerable. The pathognomonic sign is the increased breadth from condyle to condyle.

4. *Signs of separation of epiphysis.* Like those of transverse fracture; but the crepitus is softer, and the patient is necessarily young.

In every obscure case of injury to the elbow, make the patient place his hands one upon the other above his head, then bring his elbows together and compare them, using your eyes and fingers. *Treatment* of fractures of lower end of humerus. Reduce and put up in lateral angular splints, with elbow at right angles and hand in sling. When elbow tends to displacement backwards, apply angular splint behind, and a short splint in front of humerus. Passive motion in 3 weeks. But do not recklessly cause pain. I am inclined to think that it would be better to treat almost all fractures into joints by putting them up in plaster of Paris for a month, then breaking down adhesions, if any have formed, and commencing passive motions. *Complication of fracture of humerus*—injury of musculo-spiral nerve. *See NERVES, INJURIES OF.*

Hyoid Bone, Fracture of.—*Causes.*—Direct violence; rarely muscular action. *Signs.*—Crepitus, &c, with difficulty in swallowing, speaking, and sometimes even in breathing. Reduce with one finger in patient's mouth.

Jaw, Lower, Fracture of.—*Cause.*—Great and direct violence. *Situation.*—Order of frequency,—near canine tooth, at angle, at symphysis. Neck of condyle and coronoid process are very unusual places. Occasionally multiple. *Signs.*—Pain, tenderness, mouth can scarcely be opened, saliva dribbles, crepitus, deformity; frequently bleeding, for the fracture often opens through the mucous membrane of the mouth. *Prognosis.*—Union often slow. *Treatment.*—The interdental splint cannot be too strongly recommended. It should almost always be used. *See that no tooth or foreign body lies between the frag-*

ments, if the fracture is an open one. (See Lyons, *St. Barth.'s Hosp. Rep.*, 1879.) Wire round teeth damages them. Thomas and others drill the fragments and insert a silver suture.

Leg, Fracture of. See **TIBIA** AND **FIBULA**, *Fracture of.*

Metacarpus } *Fractures of.—Causes.*—Direct violence.
Metatarsus }

Treatment.—On general principles.

Nasal Bones, Fracture of.—Occasional emphysema from coincident injury to frontal sinuses. Difficulty in reduction and in preventing deformity. A silver female catheter may be inserted into the nostrils and used to raise the depressed bone. Adams's and Gamgee's apparatus for preserving the position of the bones. Vulcanised india-rubber dilator introduced empty and then filled with water has great power to raise a flattened nose. Above remarks apply both to fracture of nasal bones and of septum.

Olecranon, Fracture of. See **ULNA**, *Fracture of* (p. 163).

Patella, Fracture of.—Two kinds, one transverse and usually the result of muscular action, or muscular action combined with violence ; the other stellate, Y-shaped, or, perhaps, quite simple, but not transverse, and always caused by direct violence. The former fracture often occurs in missing a step whilst walking downstairs, or in some similar and trivial manner. In it the fragments generally separate widely, while in the stellate fracture there may be little or no separation. Consequently the former nearly always ends in fibrous union, the latter frequently in bony union. Sulcus between fragments in the transverse fracture. Great swelling and effusion into knee-joint. Inability to extend knee. *Treatment.*—Rest in horizontal position or with heel raised. Straight splint along back of limb. Elastic straps to pull upper fragment downwards and lower upwards. Steavenson's splint. Figure-of-8 bandage. Malgaigne's hooks. Malgaigne's hooks fixed into plaster after Spence's plan. Stimson's 'Co-apтation Fork.'¹ No doubt one of the chief indications is to reduce the effusion into the knee-joint without delay. This may be done with the aspirator ; it

¹ *Annals of Surgery*, May, 1885.

can also be effected to a great extent by bandaging and compressing, using plenty of cotton-wool. Hence a starch and millboard apparatus is useful.

The results of treatment for fractured patellæ have been mostly related by surgeons who have each invented or adopted some particular line of action ; and they convey too glowing an idea of the prognosis. It is highly satisfactory to the surgeon to state that there was only $\frac{1}{2}$ inch of separation ; but the point which appeals to the patient's mind is that he is, to some extent, a cripple for life, that he may never more be able to go up or down stairs like other people, or to kneel or to run freely and safely. I am speaking of results in what are usually considered good cases.

When, on the contrary, the fragments are wired antiseptically, the result is practically perfect. But this operation is not so absolutely simple as may be thought. The operator should be experienced in the surgery of bones and joints, he should be a good workman, and he should have unquestioning faith in, and a thorough practical acquaintance with, Listerism. If all these conditions were granted and I broke my own patella, I should have it sutured as a matter of course.

Operation.—Strictest antiseptic precautions. Longitudinal incision over centre of fracture, down to bone, and necessarily opening knee-joint. Great escape of serum and blood-clots. Encourage this. Clear away aponeurotic tissue which, as was first pointed out by MacEwen, falls in between the fragments. Clear away ragged aponeurosis from fractured surface. Bore, with a bradawl, from superficial surface of patella obliquely into the *fissure*, not into the cartilage. Take care that the openings in the fissure exactly correspond. One central suture suffices. Pass suture, and fix it by twisting its ends three times round in the direction in which travel the hands of a clock. This is easily remembered afterwards, when untwisting to remove the suture. Or follow Lister ; flatten the wire down on the patella and leave it permanently. See *Lancet*, November 3, 1883.¹ Establish lateral drains out of

¹ Or turn the ends of the wire into the fissure itself. (G. R. Fowler, *Annals of Surgery*, vol. ii., 1885, p. 248.)

the joint, and superficial drains also. Suture with catgut the torn aponeurosis.

Chromic gut may be used instead of wire.

Pelvis, *Fractures of*, may occur in part or parts of the os innominatum, but, for practical purposes, are best classified into those which injure a large part of the bone, *e.g.* the body or rami of the pubes, and those which merely chip off a prominence, like the ant. sup. spine of the ilium. The former are very serious, from the violence often done to the pelvic viscera, especially the bladder. *Cause*.—Usually a vehicle passing over the part. *Signs*.—Crepitus, pain (inability to stand, in the first or more serious class of cases). Often signs of ruptured bladder, urethra, or rectum. *Treatment*.—Pass a catheter to examine the state of the bladder. Rest in bed. Bandage round hips and knees. Sometimes displaced parts may be set by manipulating with the finger in the vagina or rectum. *See also* FRACTURE OF ACETABULUM, RUPTURE OF BLADDER, OF URETHRA, &c.

Radius, *Fractures of*.—1, of head ; 2, of neck ; 3, of shaft ; 4, of lower extremity. The first three are *caused* usually by direct violence, and present usual signs of fracture, viz., crepitus, pain, &c. Unless the ulna is broken also, there is little deformity. When the neck of the radius is fractured, the head does not move properly during supination and pronation. An interesting longitudinal fracture of the head and neck of the radius sometimes occurs, and has been described by Wainewright and others. *Treatment*.—For first three cases : An angular splint to fix elbow and extend along back of forearm. Forearm midway between pronation and supination. Short splint along palmar surface of forearm. Splints should be flat and wide, so as to prevent bandage from squeezing radius and ulna together. Fingers to be left free. Fixed, *e.g.* plaster of Paris, splint may be applied instead. The fourth case, *viz.*, fracture of lower end of radius, is called—

Colles' Fracture.—*Causes*.—Falls on outstretched hand. Very rarely direct violence. Especially frequent in old women. *Signs*.—Peculiar spoon-shaped deformity. Prominence of styloid process of ulna. Crepitus generally absent,

or at least indistinct. Dorsal prominence is nearer the hand than palmar prominence. Pain severe. Power of supination or pronation lost. *Anatomy*.—Upper fragment occasionally impacted into lower; lower sometimes comminuted. Dorsal prominence formed by lower fragment, palmar prominence by flexor tendons stretched over lower end of upper fragment. Position of fracture generally about one inch above carpal articular surface of radius. *Prognosis*.—If the deformity can be removed and the fracture perfectly set at first, all should be well. Otherwise, deformity will be permanent, and stiffness of the wrist and fingers may continue for many months. *Diagnosis*.—From dislocation of the wrist-joint. The fracture alters the distance between the styloid processes and the knuckles; while the dislocation does not. *Treatment*.—Every effort to be made to reduce and set properly at commencement. Extension and counter-extension. Bruce Clarke dissected a specimen in which reduction was easy, if the extensors of the thumb and carpus (radial side) were first relaxed by appropriate movements of the hand and thumb. Apparatus used are of various kinds:—Nélaton's pistol-shaped splint, applied along palmar side separately, or along dorsal side in conjunction with a short splint on palmar side of shaft of radius. Thick dorsal pad opposite lower fragment. Palmar pad thickest on radial border. (The word palmar applies here to the arm only, not the hand.) Passive exercise of fingers after second week. Second—long straight posterior and short anterior splint, padded like Nélaton's apparatus. In this case the hand is often left entirely free, so that the fingers may be exercised, and the weight of the hand may keep the radial side of the wrist extended. Third, Gordon's splints. Hand kept in prone position. Two straps. No bandages. Ridge on radial side of palmar splint. 'Overhanging lip' on radial side of lower end of dorsal splint. Lower fragment of radius occasionally, but rarely, displaced forwards instead of backwards. Fourth, Carr's splints. Dr. L. S. Pilcher demonstrates that in Colles' fracture the strong periosteum on the back of the radius remains untorn, and is the main obstacle to the reduction of the fracture. To relax it bend back the hand and wrist. Then make extension in the line of the forearm, accompanied by

moderate pressure on the dorsum of the lower fragment. Reduction is thus effected. The only apparatus Pilcher uses are a broad band of adhesive plaster round the seat of fracture, and a sling to support the arm. I can recommend this plan from my own experience.

Radius and Ulna, Fracture of Shaft of.—Treat like fracture of either bone singly. Green-stick fracture not uncommon. Splints to be wide, and to be applied whilst hand is supinated.

Ribs, Fracture of.—*Causes.*—Predisposing: old age. Rickets predisposes in some instances.¹ So also do some forms of chronic insanity (?).² Immediate are of three kinds: 1, direct violence; 2, indirect violence, the chest being compressed at one part, the rib gives way at another, just as a spring or a stick might; 3, muscular action, as from violent coughing or severe labour. *Situation.*—Usually the convexity of the rib a few inches in front of angle. Middle ribs most frequently broken, first and second ribs rarely, because protected by clavicle. *Signs.*—Catching pain on inspiration or coughing. Tenderness. Crepitus. Crepitus sometimes difficult to get, especially when the fracture is beneath the thick muscles of the back. Press alternately with the fingers of each hand, one on one side, the other on the other side of the supposed fracture. Take care to apply both hands to the same rib. Breathing shallow and abdominal. Other symptoms often arise from complications, e.g. haemoptysis. *Complications.*—1, Emphysema; 2, pneumothorax; 3, haemothorax; 4, haemoptysis; 5, wounds of heart, pericardium, or great vessels; 6, wounds of intercostal vessels; 7, &c., wounds of diaphragm and abdominal viscera, liver, or spleen. 1 and 2 imply a wound of the lung; 4 implies either a wound or bruise of the lung. Practically, cases of fractured rib are classified into those without and those with injury to the lungs. Secondary complications are inflammations and empyema. *Diagnosis.*—When crepitus cannot be obtained consider generally all the symptoms present. *Prognosis.*—If there is no visceral injury, speedy union with formation of provisional callus may be expected. If there is

¹ See *Path. Soc. Trans.* 1881-2.

² See Wiglesworth, *B. M. J.*, Sept. 29, 1883.

visceral injury, then prognosis depends on its nature and amount. The danger in such cases is threefold : first, shock ; secondly, haemorrhage ; thirdly, inflammation. *Treatment.*—Broad bandage round chest, prevented from slipping down by braces of bandage across shoulders. Strapping all round chest, or extending merely from spine to sternum over injured side. In some cases, bandaging appears to press the sharp ends of the fragments inwards ; it is then, of course, contraindicated. In bad cases, rest in bed for a few days and moderate diet. For treatment of complications, *see* articles **HÆMORRHAGE** ; **CHEST, INJURIES OF, &c.** Treatment lasts a month.

Sacrum, Fracture of.—*Causes.*—Either severe crushing force applied to the whole pelvis, or else gunshot wounds. *Treat* each case with its complications on general principles.

Scapula, Fracture of.—*Varieties.*—Four, viz. 1, of body ; 2, of neck ; 3, of coracoid process ; 4, of acromion. *See* **FRACTURE OF ACROMION AND OF CORACOID.**

Fracture of Body of Scapula.—*Causes.*—Severe direct violence. *Signs.*—(Often obscure), pain, loss of power, crepitus, irregularity in spine of scapula if fracture passes through that process. *Treatment.*—Bandage a pad over the scapula, elbow supported by a sling. *Prognosis.*—Deformity not unlikely.

Fracture of Neck of Scapula.—Two kinds, viz. 1, of anatomical neck, *i.e.* external to coracoid ; 2, of surgical neck, *i.e.* internal to coracoid process. In fracture of the anatomical neck, the symptoms resemble those of dislocation of the head of the humerus into the axilla ; but the deformity produced by the fracture, though easily reduced, at once recurs, and there is also crepitus. Still, even these points will not distinguish fracture of the anatomical neck of the scapula from dislocation of the humerus with fracture of the glenoid fossa. Fracture of the surgical neck can be recognised by bearing in mind that the coracoid process goes with the separated neck, and is detached from the body of the scapula. All fractures of the necks of the scapula are excessively rare. *Treatment.*—Raise the elbow with a sling, and keep the parts at rest with a pad in the axilla and a bandage round arm and chest.

Sternum, Fracture of.—*Causes.*—Great direct violence : rarely indirect : occasionally, even muscular effort during labour. *Signs.*—Deformity, pain, mobility, &c. *Treat* like a broken rib.

Tibia, Fracture of.—When the shaft of this bone is broken, the fibula remaining entire, the deformity is almost or quite *nil*, and other symptoms are very mild. Trace ridge of shin carefully with forefinger. Best *treatment* a plaster case. *Separation of upper epiphysis* may cause arrest of growth. *Fracture of internal malleolus* is generally combined with dislocation of foot inwards or outwards, *quod vide*.

Tibia and Fibula, Fracture of (Fracture of Leg).—*Commonest situation.*—Junction of middle and lower third. *Causes.*—Violence, direct or indirect, sometimes slight. Rare in children. *Signs.*—Typical and unmistakable. *Deformity.*—Upper fragment projects forwards and inwards in most cases. Tendency to eversion of foot (as in almost all fractures of lower extremity). *Treatment.*—Handle carefully and set at once, because of danger of converting simple into compound fracture, through sharp end of upper fragment piercing skin. Set with great toe in line with inner border of patella, so that recovery may not take place with eversion of foot. Keep straight the line of the anterior border of the tibia. *Anæsthetise* if necessary. Division of *tendo Achillis* perhaps required in rare cases. *Apparatus.*—1. Starch bandage and millboard, plaster of Paris, Bavarian splint, or some other fixed apparatus. *See* general article on FRACTURES above. 2. Cline's splints (common lateral ones with foot-pieces.) 3. Fracture-box, *i.e.* two plain side splints with back-piece furnished with foot-board. 4. M'Intyre's splint. 5. When there is much tendency to antero-posterior displacement, laying limb on its outer side, with knee and hip fixed, may be successful. 6. Anterior wire-splint. With some of these apparatus, some form of swing may be advantageously used. Keep foot at right angles to leg. Duration of treatment, usually five weeks before patient's limb may be trusted in a mere light gum and chalk case.

Ulna, Fracture of.—Three kinds—1, shaft ; 2, olecranon ;

3, coronoid process. *Shaft*.—Treat like fracture of shaft of radius. Often complicated with fracture of the radius, and sometimes, especially in childhood, with dislocation of the head of the radius. *Fracture of Olecranon*. *Causes*.—Falls on elbow ; rarely muscular violence. *Signs*.—Swelling, ecchymosis, and tenderness. Fragment drawn up by triceps. *Treatment*.—Anterior splint, thickly padded in bend of elbow, so that the limb may be slightly flexed. Passive motion in fifth week. *Result*.—Union usually ligamentous. *Fracture of coronoid process*.—Excessively rare. Ulna dislocated backwards from trochlea, easily reduced, but slips back again directly. *Treatment*.—Posterior angular splint, straight splint in front of humerus, or suture with antiseptic precautions.

Frost-bite.—Frost-bites vary in degree as much as burns and scalds. *Signs*.—In severe cases : tingling, numbness, coldness, stiffness, white or mottled appearance. Reaction is accompanied by inflammatory symptoms, and by gangrene in the severer cases. The gangrene may be either immediate, when it will be of the dry variety, or secondary to the inflammatory symptoms, when it will be moist. *Treatment*.—Resembles that of burns ; but the greatest care is required in restoring circulation to the frost-bitten part. Cold room, friction with snow, or cold flannel or fur. Stringently avoid hot water, fires, &c. In those cases where persons exposed to cold are overcome with sleep, they should not be suddenly carried into a warm atmosphere. Use friction and gradual warmth.

Gall-bladder. *See CHOLECYSTECTOMY and CHOLECYSTOTOMY*.

Ganglion.—Two kinds, *simple* and *compound*. *Simple* is said to arise from cystic enlargement of a cell in one of the fringes of synovial membrane lining the sheath of the tendon (Paget), and it is also said to be originally a partial ‘hernia’ of the sheath of the tendon (Billroth). It is rarely found actually communicating with a tendon sheath at all. It is a fibrous sac, containing a fluid, usually jelly-like, sometimes quite serous in consistence. *Situation*.—Most frequently over extensor tendons at back of radial side of wrist. *Appearance*, globular, hard, or fluctuating, transparent swelling. It may

cause feeling of weakness and often pain. *Treatment*.—1, Rupture. Place patient's wrist on your knee, then steady it with your fingers, while you squeeze, with ends of both your thumbs, the ganglion against a ridge of bone beneath it. 2, Antiseptic drainage. Subcutaneous puncture. 3, Follow up both 1st and 2nd methods of treatment with pressure by pad and bandage.

COMPOUND PALMAR GANGLION is a dilatation of a considerable part of a tendon sheath, or of several tendon sheaths. *Situation*.—Palm of hand and lower part of forearm just above annular ligament. Similar compound ganglia occasionally found in foot. *Signs*.—Fluctuating swelling above and below anterior annular ligament; crackling from melon-seed bodies usually contained within. *Treatment*.—Incisions above and below annular ligament. These should be longitudinal. Operation should be antiseptic. Remove melon-seed bodies.

Gangrene.—The term signifies the death of a part of the soft tissues of the body. The dead part is called a '*slough*.' *Varieties*.—Two main classifications:—1, into *dry* and *moist*; 2, into *traumatic* and *idiopathic*. *Causes*.—A, of traumatic gangrene,—1, *mechanical violence*, e.g. crushing and disintegrating action of a cart-wheel passing over a limb; 2, *mechanical pressure*, e.g. bed-sore, and strangulation of a limb by a tourniquet; 3, *chemical*, e.g. the effects of corrosive acids, or excessive heat or cold, or of extravasated urine. B, Idiopathic gangrene has for its remote causes the following,—1, *general anaemia*, e.g. gangrene has been known to follow excessive venesection; 2, *arterial obstruction* from *embolism* or *thrombosis* in cases of *atheroma*. This form usually occurs in old people, and is called *senile gangrene*. 3, *arterial obstruction* due (?) to spasm of the arterioles (see RAYNAUD'S DISEASE). 4, *Specific fevers* and their sequelæ, especially typhus, typhoid, and septicæmia. 5, *Certain diseases*, mostly inflammatory, e.g., *carbuncle*, *phagedæna*, &c. 6, *Poisons* inoculated or swallowed, e.g., *ergot of rye*, *serpent's poison*, &c. Certainly many of the above causes act either by diminishing the supply of blood to the part, or by obstructing its escape from the part, or by both ways combined. Gangrene produced purely

by diminished blood-supply is dry ; that caused partly or wholly by obstructed return of blood is moist. *Inflammation* is an aggravating element in most cases of gangrene and an essential element in many. Two or more of the above causes are frequently combined ; *e.g.* senile gangrene results often from a wound of the toe of an old person with atheromatous arteries. *Pathology* may be inferred to a great extent from what has been said above concerning the causes, and what will be said below about the symptoms. The appearances are primarily those of a region where the vessels are either almost empty or else distended with stagnant blood. Then, in the part itself, if blood can pass through it at all, but always in its immediate neighbourhood, inflammation occurs. Now, if the part is exposed to the air, it next begins to decompose, and one should notice that most of the so-called appearances of gangrene, *e.g.* foul odour, are rarely signs of putrefaction in the gangrenous tissues. For a time the inflammatory and gangrenous process spreads. When it reaches its limits, the inflammation on its borders produces granulations between the living and dead regions, which granulations, as it were, push off the dead structures. In some forms of the affection the gangrenous parts are crowded with micro-organisms. In gangrene of embolic origin, emboli are found in the arteries. The line where the gangrenous process stops and the wall of granulations is formed, is called the *line of demarcation*.

Symptoms and Course.—(1) Dry gangrene. First appearance often a brown spot on one toe ; this spreads, the parts affected gradually shrivelling up, the skin wrinkling, and becoming brownish-black. This process is called 'mummification.' (2) Moist gangrene begins with signs of inflammation. Then the swelling becomes boggy, skin mottled or violet. Bullæ. Discoloration spreads and deepens. Local insensibility. Fall of temperature locally. Emphysematous crackling. Foul odour. Extent of process varies from part of toe to a whole limb. Either of above series of symptoms observed in senile gangrene. Traumatic gangrene is always more or less moist and inflammatory. If patient survives, the dead parts are cast off in the way described above (*Pathology*), the

tendons and fasciæ giving way last but one, and the bone absolutely last. Process of spontaneous separation of any segment of a limb occupies months. *Constitutional Symptoms.*—In traumatic gangrene, those of great prostration and fever of a low type. In senile gangrene, they may be very slight, but usually they are those of chronic septicæma, viz., gradual exhaustion, feeble pulse, dry tongue, nervous sensibility dulled, &c. *Diagnosis.*—Gangrene must be distinguished from ecchymosis caused by blows, and from lividity the result of exposure to cold. *Prognosis.*—Depends very greatly on the cause and on the extent. Improved when a line of demarcation has formed. Worse when from constitutional than when from purely local causes. Antiseptic surgery has particularly improved the result of operations done for senile gangrene.

Treatment.—When only a small part, e.g. the end of a finger, is affected, and when the cause is traumatic, treatment is purely local, otherwise it is also constitutional. *Local treatment.*—Two objects: 1, to promote detachment of the gangrenous parts; 2, to prevent the gangrenous parts from decomposing, and thus infecting the patient and his chamber or ward. Use absorptive compresses of tow or oakum, wet with chlorine water, carbolic lotion, &c., but not too wet. Charcoal powder. Iodoform. Never drag off sloughs. Remove them gently when they are fully formed. After separation of dead parts, treat like an ordinary granulating wound.

Question of Amputation.—It has been a very safe rule in civil practice never to amputate till a line of demarcation has formed. If, however, there is much constitutional disturbance, and blood-poisoning is threatened, you may amputate at once, taking every antiseptic precaution. If the gangrene is clearly due to the force of the original injury and not to any previous defect in patient, amputation, if necessary at all, may be done at once. Leave single toes to fall off. 'If the whole foot or leg be affected, do the amputation so that it may be merely an aid to the normal process of detachment; i.e. on the borders of the healthy parts you try to dissect up only enough skin to cover the stump, and saw the bone as near as practicable to the line of demarcation' (Billroth). In gangrene after ligature

of femoral, it is not necessary to amputate above lower third of thigh (Spence).¹

Constitutional Treatment.—Relieve pain with opium (up to gr. $\frac{1}{2}$ every three hours) or morphia subcutaneously. If these disagree, use chloral (gr. xx. 6th horis) or some other anodyne. Watch their effect well. Extent to which you give or withhold stimulants and nourishment depends on relative importance you attach to remediable weakness and inflammation respectively, as factors in extending the gangrene. Nourishing food, quinine, acids, gentian, camphor, or ammonia, are used as a rule; but Syme declared that in senile gangrene he got the best results from comparatively low diet.

Prophylaxis.—For gangrene threatening from excess of tension, use free incisions. Gangrene from arterial obstruction, local warmth. Gangrene from venous obstruction, elevation of limb, support by gentle, even bandaging. *See also BED-SORES.* In severe crushes, where gangrene seems inevitable, it is better to amputate before reactionary fever has set in, unless indeed the limits of the parts hopelessly injured cannot be sufficiently made out.

Gastroscopy. *See* Miculicz in *Wiener med. Presse*, Nos. 45-52, and also *N. Y. Annals of Anat. and Surg.*, March, 1883.

Gastrotomy.—A term applied to two distinct operations, viz. : 1, opening the stomach; 2, opening the abdominal cavity only.

GASTROTOMY, or operation of making opening into stomach. Called 'Gastrostomy' when done for disease of the oesophagus.

Indications.—1. When a foreign body has entered the stomach, and cannot safely either pass through the pylorus or be vomited or extracted by the mouth. 2. When an impervious stricture of the oesophagus is of traumatic origin. Indication is then imperative. 3. In cases of cancer of oesophagus. *Prognosis.*—Very serious when done for disease of the oesophagus,² but very

¹ An interesting debate on the question of amputating for gangrene took place at the Roy. Medico-Chi. Soc., Dec. 11, 1883.

² Only three successful cases before the first edition of this work: Verneuil's, see *Lancet*, Jan. 13, 1877; Staton's, see *Med. Press and Circ.*, Dec. 29, 1880; and Lanuelongue's case. All were dressed antiseptically. Since these dates

safe (1 death in 11) when done for foreign body. In former case, death is more from advanced disease than from operation. *Operation.*—Scalpel, forceps, ligatures, director, hooks, catch-forceps, retractors, handled needles, aseptic silk ligatures, hare-lip pins. Incision, curved for 2 to 4 inches, just internal to edge of left costal cartilages, from sternal extremity of seventh intercostal space, downwards and outwards. Divide successive layers on a director. Edge of left lobe of liver may be useful as guide to stomach. Stomach may be dilated by injection of air. (See Hurry Fenwick, *Annals of Surgery*, No. 4, 1885.) If stomach is collapsed, intestine may be opened by mistake. Pull stomach out with finger and thumb. When quite certain of having got the right viscous, seize it with catch-forceps, if gastrostomy is to be done. Howse's plan of stitching stomach to abdominal wall 4 or 5 days before opening it.¹ In this way the wound can be kept aseptic until peritoneal adhesions are formed and organised. Put in plenty of sutures, 8 to 12. Macnamara's method of fixation with two hare-lip pins is perhaps the best plan. See *Annals of Surgery*, No. 4, 1885. Sew stomach to peritoneum rather than to skin. Do not open stomach too near pylorus; make opening in stomach very small. Unless patient is much exhausted, feed by enemata only for first twenty-four hours at least. When operating to remove foreign body, make opening in stomach small, and sew up with continuous suture. See also PYLORUS, EXCISION OF.

Gastro-enterostomy.—An operation devised and successfully performed by Wolfier for pyloric cancers which cannot be excised. It is the establishment of a fistulous opening between the stomach and small intestine. See *Centralblatt. f. Chirurg.* and *Edin. Med. Journ.*, 1882.

Billroth has lately done this operation as a preliminary to excision of the pylorus, closing up ends of stomach and duodenum separately, so that the latter remained merely as a

there have been others, indeed enough to greatly alter the prognosis of this operation. For statistics see F. R. Green (of Bath), *Lancet*, Feb. 3, 1883.

¹ See *B. M. J.* Nov. 26, 1881, p. 870, and *Clin. Soc. Trans.* 1881 (Meeting in *B. M. J.* Nov. 19, 1881). Gastrostomy, good short article and analysis of statistics, by S. W. Gross, in *American Pract.*, May, 1884.

kind of continuation of the common bile-duct, and no longer a passage for food. (*Annals of Surgery*, 1885, vol. ii.)

Genital Organs. See PENIS, VAGINA, &c., also appendix on Uterine Diseases.

Germs. See MICRO-ORGANISMS.

Glanders.—A disease caused by infection from the horse, and dependent upon a specific bacillus. Very rare. One of the most recent cases described by Ballance, *Lancet*, vol. i. p. 200, 1885.

Glands. See LYMPHADENITIS, TUMOURS (Lymphoma), &c.

Gleet. See GONORRHOEA.

Glenoid cavity of Scapula. See FRACTURES.

Glioma. See TUMOURS, variety Sarcoma.

Glottidis, Oedema. See LARYNGITIS.

Goître. See BRONCHOCELE.

Gonorrhœa.—*Definition.*—Specific catarrh of mucous membrane of male urethra or of female genitals. *Causes.*—Specific infection by contact with gonorrhœal or gleety secretion. The immediate cause is doubtless the gonococcus of Neisser. It appears in couples as diplococcus, and is always to be found, even in gleets of old standing. *Symptoms and Course.*—Four stages. 1. *Premonitory.*—Itching, swelling, and stickiness of meatus: occurs about two to seven days after intercourse, and lasts twenty-four hours, more or less. 2. *Inflammatory.*—Scalding, discharge of pus, painful erections, chordee, tenderness along urethra, or confined to part actually inflamed. Occasionally spasmodic retention. Glans and prepuce swollen: sometimes phimosis or paraphimosis. Duration, one week to one month. 3. Inflammation passes gradually away, but a thick discharge remains. 4. When only a thin serous discharge remains, called *gleet*. *Pathology.*—Redness, swelling, &c., of mucous membrane of urethra. Occasionally slight excoriation or ulceration. Micrococci have been found in gonorrhœal pus, and in the inflamed membrane itself. Parts chiefly affected, fossa navicularis and bulbous part. Cause of chordee, effusion of lymph into corpus spongiosum, which effusion prevents lower border of penis from extending proportionally during erection. *Complications.*—Bubo, balanitis,

phimosis, paraphimosis, hæmorrhage, cutaneous rash, gonorrhœal rheumatism, epididymitis, cystitis, prostatitis, perineal abscess, retention of urine, chordee. Gonorrhœal ophthalmia. All but chordee are noticed in separate articles. *Treatment.*—Local and general. Local is effected by (1) injections; (2) soluble bougies of cacao butter (Mr. W. T. Cooper¹); (3) insoluble bougies. There are also external local applications, such as cold sitz-bath, ice to perinæum. *Rules for injecting.*—Pass the nozzle into the urethra, right up to the hilt, and press it home. Hold the glans close up to it with the left forefinger and thumb. Inject slowly till the urethra is full. (There need be little or no fear of mischief from an ordinary injection entering the bladder. It is unlikely to get so far at all.) Retain the injection three to five minutes if possible. In most cases inject after each urination. *Method of Irrigation.*—Many surgeons prefer this, and have devised various plans. A No. 6 or 7 soft india-rubber bougie, connected with a syphon tube, is an effective apparatus. Lubricate the catheter with vaseline. *Injections.*—As a basis 'strong' tragacanth mucilage is excellent. It will remain in the urethra all night. The many urethral injections which have been used successfully may be classed more or less accurately, as (1) antiseptics, (2) astringents, (3) sedatives, (4) cleansing. Antiseptics: iodoform (gr. xxx. to tragacanth. emuls. ʒ.j.), carbolic lotion (1 to 40), permanganate of potash (gr. j.-ʒ.x.), chloralum (gr. iij. to ʒ.j.), borax (gr. v.-ʒ.j.), zinci chlor. (gr. j.-ʒ.j.). With these might be classed also bismuth, solutions of iodine, many also of the astringent injections, which are both astringent and antiseptic. Glycerine is constantly combined with injections of all kinds, and its value possibly lies in its power of checking fermentative changes. Secondly, astringent injections: tannic acid (gr. v.-ʒ.j.), zinci sulph. (gr. ij.-ʒ.j.), zinci sulpho-carbolat. (gr. ij.-ʒ.j.), zinci acet. (gr. ij.-ʒ.j.), plumbi acet. (gr. ij.-ʒ.j.), argent. nit. (gr. ¼-ʒ.j.). Also solutions of kino, catechu, and eucalyptus gum. Thirdly,

¹ As cacao-butter bougies melt as soon as they enter the urethra, they differ little from a thick fluid injection. They have these advantages, that they are sure to enter the urethra, and that they remain there, but they do not *distend* the urethra as a properly administered fluid injection does, for several minutes.

sedative injections : sedatives are almost always used in combination, *e.g.*, liq. morph. acet. $\text{m}\text{x}.$, glycerini acidii tannic. $\text{m}\text{xx}.$, aquæ $\mathfrak{z}\text{j}.$ Many excellent injections are combinations. Such a one is the French injection of M. Brou, containing probably calamine, opium, and some astringent vegetable decoction. Powders, such as zinci oxid., in suspension, cling to the urethral surface ; hence the value of bismuth.¹ A little cotton-wool should be worn over the meatus and glans. The prepuce will keep it in place.

Soluble Bougies can be medicated with any of the above substances. It is customary to place a piece of lint or cotton-wool over the meatus after passing the bougie, and to fix it with strapping.

Insoluble Bougies are sometimes dipped in an active agent, sometimes used unmedicated for gleet.

Modifications in Treatment according to the Stage of the Disease.—First stage. ‘Abortive treatment.’ Rest as much as possible ; at all events avoid fatigue. Moderate diet. No stimulants. Frequent cold hip baths ; saline purgatives ; alkaline and demulcent drinks ; large doses of ol. santalini ; cubebs ; acetate of potash ; weak astringent and antiseptic injections, repeated as often as possible. Second stage. General treatment same as first stage. But be more cautious about introducing irritants into the urethra. Treat complications. For chordee : belladonna extract applied over corpus spongiosum, morphia and henbane suppositories ; warm baths ; sleeping draught at night. Sp. camph. $\mathfrak{z}\text{ss}.$ doses, internally. One minim of tinct. aconiti every hour will sometimes cut short this stage. Ol. santalini. Third stage. Still prohibit stimulants and avoid fatigue. Persevere with injections ; vary them if the case be obstinate. For use of copaiba, &c., *see* below. Fourth stage (that of gleet). Continue injections and general treatment, but improve diet. Change of air. Tonics, *e.g.* iron, quinine, strychnia, gentian, &c. But gleet is so often kept up by a slight stricture, that it is imperative to examine well the

¹ An excellent formula is the following : R. Zinci sulph., plumbi acet. \mathfrak{aa} $\mathfrak{z}\text{ss}.$, bismuthi trisnit. $\mathfrak{z}\text{ij}.$; tinct. opii $\mathfrak{z}\text{j}.$; glycerini $\mathfrak{z}\text{j}.$; aquæ q. s. Ft. injectio, $\mathfrak{z}\text{xij}.$ Shake well. If this should be too irritating, reduce the quantity of zinc and lead.

urethra in obstinate cases, and to dilate it if necessary. It is a good rule, in treating gonorrhœa, to inject after every act of micturition. Persons away from home all day should use the compressible metal tubes, filled with injection, and having a nozzle to enter the urethra, made, at my request, by Mr. Cooper, of 66 Oxford Street. They should be carried in the coat side-pocket. Mr. Watson-Cheyne urges that, in treating a gonorrhœa, the first thing to aim at should be the destruction of the specific nature of the disease. To effect this he recommends a bougie (iodoform, gr. v., ol. eucalypti, gr. v., ol. theobromæ, q. s.). Patient passes the bougie, and lies down for six hours. Follow up with injections of emulsion of eucalyptus oil till a slight simple urethritis remains. Then resort to some ordinary astringent injection. The chief difficulties of curing a gonorrhœa arise from the disobedience or impatience of the patient, who relaxes his attention to his disorder as soon as it begins to improve, whereas he ought to persevere with the treatment even for a week after the disease is apparently quite cured. The surgeon should teach the patient how to inject. He should administer the first injection himself. A suspensory bandage should be worn as a prophylactic against epididymitis. The ordinary one is often quite useless. The bandage made for me by Messrs. Arnold, of West Smithfield, should be used. Chastity is obviously indicated for more than one reason. Warn patients of danger of gonorrhœal ophthalmia.

Copaiba, Cubebs, and Oil of Sandal-wood.—Cubebs best in first and third stages, copaiba and oil of sandal-wood good for any stage. Dose of copaiba, 2 capsules three or four times a day, or 3 gr. of the balsam made into an emulsion with yolk of egg, or floating on infusion of roses three times a day. Dose of cubebs: ʒss. (+ potass. bicarb. gr. xx.) ter die. Cubebs and copaiba together: make the cubebs up into pills with copaiba balsam and white wax, and give ten pills three times a day. ‘Capsules’ are, of course, more convenient. Dose of oil of sandal-wood: ℥ xv. ter die. Rx ol. santalini ʒss.; sp. vini rect. ʒjss. M. ft. mist. S. ʒj. ex aquæ ʒj. ter die.

Copaiba Rash is papular, and sometimes resembles urti-

caria, sometimes measles ; but there is no fever, and the rash is patchy, chiefly affecting skin over joints.

GONORRHœA IN FEMALE.—*Parts affected.* Vagina and vulva. Disease may spread considerably, even up urethra to bladder, and, it is said, through Fallopian tubes to peritoneum. Other complications are **bubo**, labial abscess, and warty growths. **Less common** are metritis and ovaritis. *Treatment.*—Chief **special** points are, to use large quantities of weak injections pumped freely into vagina, to insert a piece of cotton-wool smeared with iodoform and vaseline (3ss.—3j.) between the labia after each injection, and to prescribe rest, both local and general.

Groin, chief Surgical Diseases of.—See Table in Holmes's *System*, vol. v. p. 999.—1, Psoas abscess ; 2, glandular abscess ; 3, abscess from diseased hip ; 4, simple abscess ; 5, enlarged glands ; 6, cysts ; 7, encysted hydrocele ; 8, common hernia ; 9, incarcerated hernia ; 10, strangulated hernia ; 11, retained testis ; 12, varix of saphena vein ; 13, aneurism ; 14, malignant disease ; 15, other tumours. Of these, hernia alone is sometimes resonant on percussion. Common hernia and varix of saphena are alone completely reducible. Psoas abscess, encysted hydrocele, and retained testis are or may be partly reducible. Abscesses, cysts, varix, and aneurism may fluctuate. Abscesses (excepting psoas), inflamed glands, and inflamed aneurism, show heat, redness, &c. Impulse on coughing may be found in hernia and psoas abscess, and, much more rarely, in cysts, strangulated hernia, retained testis, and some tumours. Holmes's table is worth committing to memory. The impulse felt in the saphena vein is different in quality from that of a hernia, and it may be felt down the vein, some distance from the ring, even when the patient lies supine.

Gums are affected by *abscess* (so-called gum-boil), by *ulceration*, and by *hypertrophy*. *Abscess* arises from irritation of carious tooth. Foment ; open when abscess has fairly formed ; attend to teeth. *Ulceration* is caused by mercury, scurvy, syphilis, and, indeed, any other cause of stomatitis. Remove cause. Wash with pot. chlorat. ; paint with sol. argenti nit. gr. x.—3j., or touch with solid argenti nit. Tonics and pot.

chlorat. internally. *Hypertrophy* may require outgrowth to be snipped off.

Gumma. See *SYPHILIS*.

Gunshot Wounds.—Belong to the class of contused wounds. *Causes.*—1, Mere explosions of powder ; 2, wadding ; 3, small shot ; 4, bullets and slugs ; 5, cannon-balls ; 6, splinters of shells.

Pathology and symptoms are most conveniently described together under the head of,—*Characters.*—Four chief forms of gunshot wound, viz. :—1, Simple contusions. Caused by spent shot, or by ‘oblique impact.’ Formerly attributed to ‘windage.’ May produce most severe internal injuries with no visible damage to skin. 2. Superficial wounds, grooving not tunnelling the flesh. 3. Where bullet lodges. Particles of clothing, &c., may enter with it. 4. Where bullet pierces and escapes. Though bullet escape, foreign bodies carried in with it may remain. Rifle-bullets, as distinguished from musket-bullets, make cleaner and less contused wounds, but smash and splinter bones, and pierce the body with a straighter and more undeviating course. They also cause greater shock. Burns from powder may occur at close quarters. *Shock.*—Depends much upon individual constitution. Is usually great. Pain usually slight, often unnoticed. *Hæmorrhage.*—Primary rarely very serious, except when largest vessels are wounded. Secondary is very common, perhaps because of bad sanitary conditions to which an army is exposed. *Examination.*—First see how many wounds there are. Then, at least in civil practice, examine patient’s clothes. Apertures in them may indicate the direction of the wound ; the absence of a piece of cloth may suggest its presence in the wound ; or the exit of the bullet may, in rare cases, be proved by its being found in the clothes. Then explore the wound with the finger, carbolised. But the surgeon should insert neither probe nor finger unless he is prepared to follow up his search, if necessary, by operative measures at once. Place the patient in the attitude in which he received his wound ; its direction can thus be better judged. Examine carefully once for all. Counter-manipulation with the fingers of the other hand to assist the finger in the

wound. *Instruments for Detection of Bullets*.—Nélaton's probe (porcelain head). De Wilde's electric bell indicator. Krohne and Sesemann's electric indicator. Graham Bell's electric indicator. Lecompte's stilet pince, which bites a piece off the supposed bullet. *Objects of examination*.—1, to search for foreign bodies ; 2, to ascertain direction and extent of wound ; 3, to estimate amount of injury done to certain parts, *e.g.* fractured bones.

Apertures of Entrance and of Exit.—Former is cleaner and smaller than latter, smaller even than the ball which made it. Latter is everted and larger and lacerated. The quicker the passage of the ball the less are these differences ; and they are sometimes nil. Only part of a bullet may have escaped by the aperture of exit, if a bone have been struck. Or a split bullet may make its exit in two places. Bullet may rebound from a bone and fall out of aperture of entrance. Course of slow bullets sometimes very peculiar.

Healing.—1. Small ring-shaped slough and gangrenous shreds thrown off. 2. Granulation and, frequently, suppuration. Opening of exit usually closes before that of entrance.

Prognosis.—Depends on amount and position of injury, on surroundings (whether sanitary or otherwise), and to a great extent upon how far the patient's wound has escaped examination by septic probes and fingers. 'The extensive tearing and crushing caused by large missiles do not differ from other large crushed wounds caused by machinery.'

Treatment.—Principles of treatment same as those of other contused wounds ; differences of detail chiefly depend on peculiarity of surrounding circumstances.

1. In battle, cover, if possible, with some antiseptic or aseptic substance ; check haemorrhage by pressure, apply extemporised splints to fractured limbs, give stimulants in case of syncope, and convey patient to place of first dressing.

2. Apply first dressings at a place previously selected. Here also remove all foreign bodies that are near the surface, and amputate limbs hopelessly crushed. Attach to each patient, before sending him on from here, a card with short account of his case, stating, *e.g.*, whether ball has been ex-

tracted or a wound of the trunk is or is not perforating. Field officers should ligature, if possible, every wounded vessel of importance (Longmore).

3. Convey patient to hospital. Here examine every patient, operate, dress wounds, bed, and diet. Too many wounded should not be kept collected in one place.

Hæmorrhage.—On the battle-field, as above stated, pressure must be relied on. If this has to be applied forcibly, or so as to constrict a limb, it is clearly important to move patient with all speed to place of first dressing, or to hospital, if near enough. In dangerous hæmorrhage, the general rule of tying the vessel above and below the bleeding point applies. This is best done through a large free incision parallel with the axis of the limb, which should have previously been rendered bloodless by elevation and the elastic band. All clots must be turned out, the wounded vessel tied, the parts thoroughly and searchingly asepticised, any foreign bodies found, removed, the elastic band taken off, &c., and the wound sutured, drained, and dressed.

Antiseptic Methods in Military Surgery.—These necessarily have to be simple. The handiness, permanence, and reliability of iodoform give it great value. A thin layer can be dusted on and around the wound. Pillows of antiseptic and absorptive material packed in gauze, and fixed in place by elastic or gauze bandages, or, better still, by both. Irrigation instead of the spray. Various little packages have been devised containing antiseptic materials for the first dressing, and meant either to be continually carried about by the soldier or to be distributed to him on the eve of battle.

Esmarch's triangular bandage.

Extraction of Bullet.—Tiemann's forceps. Coxeter's extractor. If violent measures would be required for removal of bullet, let it remain, unless it is obviously setting up irritation.

GUNSHOT WOUNDS OF SPECIAL PARTS.—*Head.*—Very dangerous, from the diffused injury done to the brain and its membranes. Inner table fractured more than outer. Frequent complication with meningitis, abscess, &c. Gunshot

wound of brain almost always fatal. Fracture with depression usually fatal. *Treatment*.—Perfect rest, darkness, low diet. Cold locally. Venesection may be useful. Trephining indicated when there is evident comminution or suppuration, or intracranial haemorrhage. Use strict antiseptic precautions and provide for drainage. Do not mistake a wound in which part of outer table of skull has been ploughed off, for fracture with depression.

Thorax.—Classification, diagnosis, complications, &c., much the same as other wounds of chest. Non-penetrating wounds of any violence almost sure to bruise lung. Penetrating wounds fatal 9 times out of 10. *Treat* like other wounds of chest. Allay first haemorrhage, secondly inflammation. To temporarily check bleeding from an intercostal artery :—a large piece of linen is laid over wound, 'and the middle portion of this linen is pressed into the wound by the finger, so as to form a kind of pouch. This pouch is then distended by sponge or lint pushed into it until the pressure arrests the bleeding ; on stretching out the corners of the cloth the pressure of the plug will be increased' (Longmore). These materials should be asepticised. Where practicable the rule of tying both ends should be obeyed.

Abdomen.—Resemble wound from other causes. But even non-penetrating wounds often fatal. *Penetrating* wounds. Ball may pierce more than one viscus. The chief sign, sometimes the only sign, of penetration is the extreme collapse. Recovery may take place ; then often a faecal fistula. Gunshot wounds of bladder have often recovered. Apply the general principles of abdominal surgery. *See ABDOMINAL SECTION*.

Extremities.—Injuries to soft parts only, usually do well, unless some large artery or nerve be struck. Injuries to *bones* are remarkable for comminution, and frequency of longitudinal fissure into joints. Consequent special liability to osteomyelitis and blood-poisoning. Impossible to be so conservative in treatment as is usual in civil practice. The old rule was to amputate for fractures in middle and lower third of femur. This rule should be greatly modified by such results as Berg-

mann and others obtained from the application of antiseptic principles during the Russo-Turkish campaign. Put up most fractures in immovable plaster case. Immovable apparatus do not seem so well adapted for fractures of the femur. In gunshot injuries of extremities, as of other parts, ordinary rules of surgery apply, only bearing in mind the smashing and splintering and the special difficulties in after-treatment. Put up excisions in immovable plaster cases. In many cases of wounded knee-joint, an attempt may be made to save the limb ; here again a plaster case is to be recommended. Fractured thighs not to be transported far to hospital.

Hæmatocele.—Effusion of blood into tunica vaginalis. Sometimes unnecessarily classified into traumatic and spontaneous. Almost always traumatic, the *cause* being a blow or puncture. It is likely that hæmatocele is often caused by a rupture of a varicose vein. Slight violence is in many cases sufficient to produce this. Witness the cause of Miss Neilson's death—ruptured varix of Fallopian tube during an attack of gastralgia. Hence blood escaped into peritoneal cavity. When a varicocele ruptures, the blood fortunately is more likely to enter a less important serous sac, the tunica vaginalis. *Pathology.*—Tunica vaginalis contains blood, which usually remains fluid, only becoming gradually darker and thicker and full of fibrinous shreds. Sometimes it coagulates more or less. Tunica vaginalis thickens. At any period inflammation and suppuration may supervene. *Symptoms.*—Gradual but rapid formation of a smooth, globular or pyriform, hard or semi-fluctuating, non-transparent, heavy tumour. Testicle situated usually below and behind ; on firm pressure in that region, the peculiar testicular pain is felt. Marks of bruising may appear in skin. Painless, except when quite recent. *Diagnosis.*—From 1, solid innocent enlargement of testis ; 2, solid malignant tumour of testis ; 3, hydrocele. Case 1. Chronic orchitis begins usually with acute orchitis, or there is a history of syphilis or scrofula : it comes on more gradually than hæmatocele. Case 2. Cancer begins more gradually, but enlarges more persistently, and is painful ; lumbar glands enlarge sooner or later in cancer. In both chronic orchitis and cancer,

thickening of cord is common. *Case 3.* As even hydroceles may be opaque, unless there is a history of severe violence followed by a sudden swelling and ecchymosis, a final diagnosis cannot be made without the trocar. *Prognosis.*—Only mild and recent cases offer any reasonable hope of absorption. Old cases, after reaching a certain size, usually remain stationary. Inflammation may occur at any time. *Treatment.*—1. When hæmatocoele is recent. Rest in bed, application of cold, elevation of pelvis and scrotum. 2. Later : tap with trocar and cannula, and then support with pressure. 3. In old cases with thick walls, or in any case when suppuration occurs, incise freely and empty. Do this antiseptically. Operation not without danger. *Hæmatocoele* of the tunica vaginalis of the cord occurs but very rarely. Symptoms, &c., can easily be inferred. Blow on part, ecchymosis, swelling, &c.

Hæmatoma. *See TUMOURS (CYSTIC).*

Hæmaturia. *See URINE.*

Hæmophilia.—*Hæmorrhagic Diathesis.* A congenital tendency to free bleeding after trifling injuries, or even no injury at all. Mostly hereditary. Want of fresh air, of dry lodging, and of exercise, said to increase the diathesis. Attacks males more than females. But the latter are frequently the 'intermediaries' in its hereditary transmission. *Symptoms and Course.*—Bleeding from nose and mouth, with or without obvious exciting cause. Spontaneous ecchymosis beneath the skin. Bleeding often preceded by premonitory symptoms, such as vascular excitement, smell of blood in nostrils, and pains in limbs. In intervals of hæmorrhage joints swell and even inflame. Loss of blood produces anæmia. *Pathology.*—'Probably abnormal thinness of the arterial walls' (Billroth). Nuclei in the walls of the vessels more numerous, especially in the veins (Buhl and P. Kidd). *Prognosis.*—Most patients die young. Some seem to outlive the malady. *Treatment.*—Employ every means to strengthen general constitution. To check hæmorrhage use ordinary means, and, in addition, in serious cases, give sodæ sulphatis, ʒss., occasionally, and two to five grains of ergot every half-hour. Turpentine in drachm doses. *See Legg on Hæmophilia.*

Hæmorrhage.—Hæmorrhages are classified in several ways, viz., first, according to their source into 1, arterial ; 2, venous ; 3, capillary ; and 4, parenchymatous. ‘Parenchymatous’ is a term applied by the Germans to hæmorrhage from the tissues full of small arteries and veins, *e.g.* the penis and the tongue. Secondly, hæmorrhages are classified, according to the time of their occurrence, into 1, primary (*i.e.* at time of wound) ; 2, intermediate or recurrent (within a few hours) ; 3, secondary (*i.e.* a few days after wound). A third classification is into 1, traumatic ; 2, spontaneous (*vide Hæmophilia*). Surgeon-major Porter described an intermittent hæmorrhage from malarial influence.

Arterial Hæmorrhage contrasted with Venous Hæmorrhage.—Arterial is florid and spurts in jets ; venous is dark, and either does not spurt rhythmically at all or does so only in relation with the acts of respiration. Arterial, however, is dark when respiration is interfered with ; and venous is florid sometimes, when it wells up from a deep wound and is thus exposed to the air before becoming visible.

Natural Checks to Hæmorrhage.—Arterial hæmorrhage is stopped naturally by—1, active contraction of vessel ; 2, passive contraction, consequent on decrease of total quantity of blood in system ; 3, weakening of heart caused by loss of blood ; 4, obstruction of vessel by clot. The first three are, one or other, more or less accessory to the operation of the fourth cause.

Venous hæmorrhage is stopped partly by causes similar to those which check arterial hæmorrhage, and partly by the action of the valves in the veins. Capillary hæmorrhage is stopped by the contraction of the connective or other tissues in which the vessels are embedded, and by coagulation. Hence, when these tissues are diseased, capillary and also parenchymatous hæmorrhage may be very troublesome.

Pathology.—Natural changes in and around a wounded vessel. *a.* If wound be partial and transverse, the wound gapes ; bleeding is considerable and has to be checked ultimately by clotting, which may not occur till syncope comes on and predisposes to it. *b.* Wound longitudinal. Wound does not tend to gape. Hæmorrhage is, therefore, more easily checked by coagulation and contraction. *c.* Wound completely dividing artery. 1, the ends of the artery retract into the

sheath, sometimes curling or twisting up ; 2, the ends contract ; 3, coagulation takes place within the artery ; 4, coagulation occurs outside the artery, within and sometimes without the sheath ; 5, organisation of the clot or of part of it ; finally, cicatricial contraction occurs in the newly-organised tissue. Recurrent hæmorrhages are caused by the returning force of the circulation, which, when a patient becomes warm in bed, may be enough to open a vessel not firmly closed.

General Symptoms of Hæmorrhage.—1, Face first pale, then blue ; 2, pulse sinks ; 3, temperature sinks ; 4, dizziness ; 5, nausea or vomiting ; 6, eyes dazzled ; 7, noises in ears ; 8, fainting and unconsciousness ; 9, either the patient recovers or gets worse. In the latter event the following set of symptoms are noticed : 1, face waxy ; 2, lips blue ; 3, eyes dull ; 4, body cold ; 5, pulse thready, frequent ; 6, breathing incomplete ; 7, repeated swoonings ; 8, permanent unconsciousness ; 9, twitchings of arms and legs ; then death.

Treatment.—Many cases require great decision, sound anatomical knowledge, and considerable courage for their proper treatment. Classification of local remedies, seven chief classes, viz : 1, ligature ; 2, suture ; 3, torsion ; 4, acupressure ; 5, compression ; 6, flexion ; 7, styptics ; 8, position.

Ligature.—Divided into—1, ligature at the bleeding point, and 2, ligature of the artery above the wound, *i.e.* ligature 'in the continuity.' General rule.—In case of a vessel being wounded, cut down upon the wounded point, and tie the vessel immediately above and below the wound. But in some cases such an operation would involve a very deep and large incision *e.g.* in hæmorrhage from upper part of posterior tibial artery ; and in other cases, the artery is diseased at the spot bleeding. In such cases the artery is often tied in the continuity. It should be borne in mind that the latter is not a thoroughly reliable plan, owing to existence of anastomoses, and to the fact that the distal part of the divided artery is possibly not affected by it. Moreover, very deep and long incisions can safely be made parallel with the axis of a limb. Esmarch's bandage should be used. Measures having been taken to secure drainage and

asepticity, such incisions should be closed by deep as well as superficial sutures. Materials used : silk, hemp, catgut, animal tendons.¹ Operation.—Instruments required are scalpel, forceps, retractors, director, artery-forceps (occasionally, also, aneurism-needle), tenaculum. In tying an artery at the spot wounded, a sufficiently free incision should be made (usually by enlarging the wound which leads down to the artery), and then each end of the bleeding artery should be seized and ligatured if the vessel has been divided completely. But if the vessel has been only punctured, two ligatures must be applied with the aneurism-needle, one above and the other below the wound. Secure the ligature with a reef-knot, pulling each end of the knot tight with the tips of the forefingers pressed against it. To tie the artery in the continuity, see the directions given under the head of ANEURISM. When large venous trunks are wounded, but not divided, it is justifiable, or even advisable, to close the wound either by suture or by lateral ligature, so as not to block up the vein. The strictest antiseptic precautions are essential. All the cases on record in which such have been adopted have recovered. Five out of six of the femoral vein, in which they were neglected, died of pyæmia.² *Pathology; the effects of ligature.*—Internal and middle coats divided, curl up within external coat, which is merely constricted. Formation of conical plug of fibrin. Inflammatory new formation (*i.e.* escape of leucocytes from blood-vessels into and around clot and arterial coats, and their organisation into fibrous tissue). Tied artery eventually dwindle into fibrous cord. Aseptic ligatures may be used differently—*i.e.* so as not to divide the inner arterial coats. Hence their value in cases where secondary hæmorrhage is specially feared—*e.g.* ligature of large arterial trunks near the orifices of important branches.³

¹ Kangaroo and moose-deer. On the former refer to Girdlestone in *Med.-Chr. Trans.*, 1882. The tendons used are those of the tail.

² See Pilcher, *N.Y. Annals of Anat. and Surg.*, Aug. 1883.

³ With regard to tying arteries in their continuity, the questions of method and material are ably dealt with by Ballance and Edmunds (*Med.-Chr. Trans.* 1886, p. 443.) They recommend a small round ligature, *not* tightened to cut inner coats.

Suture.—Rents in large venous trunks have been successfully closed by continuous catgut suture, by Schede and by Lister.

Aseptic animal ligature becomes absorbed or organised. It is essential that it should be of good quality to begin with, and it improves in toughness and durability with age. Chromic gut is more durable than carbolic. Macewen's directions for preparing chromic gut, which may be relied on to resist the action of living tissues for a fortnight, may be summarised as follows : Place good thoroughly dried old gut in one part of an aqueous solution of chromic acid (1-5 strength) + five parts of glycerine. After a week or a fortnight in this solution, the gut is removed and stored in a 1-5 solution of carbolic acid and glycerine. The power of the tissues to absorb animal ligatures appears to vary with the individual patient, within certain limits. The surgeon should have the animal ligatures he uses tested by culture experiments.

Torsion.—Bryant's directions are : 'The vessel should be drawn out, as in the application of the ligature, and three or more sharp rotations of the forceps made. In large arteries such as the femoral, the rotation should be repeated till the sense of resistance has ceased ; the ends should not be twisted off. In small arteries the number of rotations is of no importance, and their ends may be twisted off or not, as the surgeon prefers.' 'When the vessels are atheromatous, or diseased, fewer rotations of the forceps are required, the inner tunics of the vessels being so brittle as to break up at once and incurve. The effects of torsion practically resemble those of the ligature, but the inner coats curl up more in the former case, sometimes forming a regular valve. Though torsion leaves no dead foreign body in the wound like a piece of ligature, yet the bruised end of a twisted artery can scarcely be more likely to live and form adhesions than the less damaged end of a ligatured artery.'

Acupressure has been noticed separately. *See ACUPRESSURE.*

Compression.—Several forms :—1, tourniquet ; 2, digital ; 3, ordinary bandages with or without graduated compress ; 4, elastic bandaging ; 5, sponge-pressure ; 6, forcipression ; 7,

clamp. Chief kinds of tourniquets are Petit's and Signorini's ; Petit's is most used for operations, and consists of a webbing band, with a pad, and a screw for tightening. It is usual to place a small compress, made of a small soft roll of bandage or of lint, over the artery to be compressed. Signorini's tourniquet is used chiefly in the treatment of aneurism, and it consists of two curved metal arms, with a screw hinge between the two, and a pad for the artery at the extremity of one. Lister's tourniquet for the abdominal aorta is on the principle of Signorini's. In applying any tourniquet it is necessary to adjust it with great deliberation and care, otherwise the pad is very liable to slip off the artery. One should mention here the lever used by Davy, with great success, to compress the iliac arteries, *per rectum*. *Digital Compression* is preferable in almost every case, 1, because of the liability of all instruments to slip out of place ; 2, because the human finger is so delicate, tender, and elastic when compared with a rigid tourniquet or bandage. But it is difficult to obtain for this purpose, and expensive of time and labour. In some cases, *e.g.* hæmorrhage from internal carotid into pharynx, no other form of compression might be applicable. Digital is often supplemented by the compression of a small sand-bag, placed upon the finger, which sand-bag supplies the place of muscular force. *Bandaging*.—In arterial hæmorrhage from a limb, if an attempt be made to check it by the bandage and compress, the joints should be flexed, and the whole limb bandaged. There is a form of compression called 'plugging ;' for instance, if a gluteal aneurism were opened freely in mistake for abscess, the proximal end of the artery would very likely be in the pelvis and inaccessible ; then the aneurism would have to be stuffed with aseptic sponges, and the pelvis bandaged, *pro tem.*, whilst further measures were considered or undertaken. Elastic bandages and compresses are preferable to others.

Sponge-pressure.—From their elasticity and softness sponges are particularly valuable. Antiseptic gauze bandages fix them well.

Forcipressure.—Small catch-forceps are of great value in the course of an operation, and in exceptional instances may be

used to check haemorrhage even for a long period. *Clamps* are used in special operations—e.g., excision of haemorrhoids, of elephantiasis scroti, and of ovarian cysts.

Flexion.—Is closely allied to compression, and should almost always be combined with it. One objection to flexion is the disagreeably constrained position often unavoidable. To demonstrate the value of flexion, bend the elbow strongly and feel the pulse at the wrist ; it will be scarcely perceptible.

Styptics.—1, heat ; 2, cold ; 3, drugs—e.g. iron perchloride, tannic acid, gallic acid, alum, matico, and many others. *Heat*. The actual cautery is the only form in which the manuals speak of heat as a styptic ; but hot water (120° to 140° Fahrenheit) has the power of closing small bleeding vessels.¹ In haemorrhages from mucous membrane, for example, those which Billroth calls ‘parenchymatous,’ hot water is more effectual than cold ; so also in oozing from wounds. In major amputations it should be preferable because it is less depressing than cold. The actual cautery should be used at a black heat, and held close to, but not touching the bleeding part. It causes an eschar with a suppurating surface beneath. Cold is applied chiefly in the form of ice or iced water. The most powerful styptic drug is perchloride of iron. The strongest tincture is usually employed, and it is often made to saturate a compress. Thus, styptics, pressure, and flexion can all be combined if desirable. Billroth speaks of turpentine as a most effective but painful and heroic styptic. The above remedies should be supplemented by elevation of the part, general rest, and avoidance of anything likely to excite the patient’s circulation. *General Treatment*.—Is indicated for the faintness and weakness caused by haemorrhage. Horizontal posture, ammonia, ether, wine. The application of Esmarch’s bandage to a limb has been suggested, to drive more blood into the vital centres (Wharry). When applied for this purpose it should be to the lower and not to the upper limb. *Transfusion*. *See TRANSFUSION*.

Secondary Hæmorrhage.—Its causes are, 1, defect in the ligature itself ; 2, defect in the manner of tying it ; 3, the

¹ See ‘Hot Water as a Hæmostatic,’ in *Practitioner*, Feb. 1879.

ligature's having been applied too near an offset of the artery, so that collateral circulation has prevented the formation of the usual fibrinous plug ; 4, atheroma ; 5, suppuration or sloughing of the wall of the artery ; 6, vascular excitement. The approach of secondary hæmorrhage is usually insidious, but it is frequently very sudden, and may be fatal even in a few minutes if the artery be large. *Treatment of Secondary Hæmorrhage.*—*Prophylaxis.*—The surgeon should see that his ligatures are of good quality. If of catgut, they should be either old, well-seasoned, or specially prepared and tested. They should be properly tied. Branches leaving the ligated trunk near the ligature should generally be included in it. But the best security against secondary hæmorrhage is to keep the wound aseptic, free from danger of tension, and in a condition favourable for processes of adhesion as well as inimical to suppuration.

When secondary hæmorrhage has actually occurred, never delay or temporise. The first thing to be tried is pressure, and if properly applied it will rarely fail. The mode of application must necessarily vary with the case, only it should always be firm and uniform ; the bandages, unless elastic or gauze, should be starched ; the compresses over the bleeding point should be graduated, and, if the bleeding artery be in a limb, the bandage should cover the whole of the limb. With pressure should be combined perfect rest, elevation, and flexion. To secure rest, splints are sometimes useful. For vascular excitement, give vascular sedatives—*e.g.* tinct. digitalis. *Vide Treatment of Hæmorrhage in general.* When these means fail, the choice then lies between ligature of the bleeding vessel at the bleeding point, ligature of the artery in the continuity, digital pressure, and amputation of the limb. Some cases are adapted for the use of the actual cautery, of styptics, or of acupressure. Ligature of the artery in the continuity is to be deprecated, because it is liable to be followed by gangrene, and is, moreover, far from a certain remedy. Ligature at the bleeding point is often useless, because the tissues are there so diseased, or it is objectionable because it would involve opening up a large stump nearly healed. Digital pressure is not always

readily obtainable. Certain cases are suitable for amputation. These cases are secondary hæmorrhage from the main arteries of the lower extremity, when pressure, rest, elevation, flexion, and re-tying at the bleeding point have failed. In such cases, tying the main artery in the continuity is very liable to be followed by gangrene, and re-tying at the bleeding point may be impossible from the depth of the wound and the state of the tissues.

Hæmorrhoids.—Are essentially varices of the inferior hæmorrhoidal veins. Two varieties, viz., 1, external ; 2, internal. *Causes.*—(a) Predisposing : everything which congests the portal system or the hæmorrhoidal tributaries of that system. Constipation, high living, sedentary habits, liver complaints, indigestion, feeble circulation, inflammatory disease of the rectum or other pelvic or perineal parts—*e.g.* fistula. Pregnancy. Relaxing climate. Early manhood and middle age. Uncommon in young women. (b) Exciting causes : various forms of local irritation : fits of intemperance in eating or drinking, dirt, use of rough irritating material for the person, sitting on cold slabs, drastic purgatives. It will be observed that no sharp line separates some of the exciting from some of the predisposing causes. *Pathology.*—All piles at first are merely local congestions or vascular dilatations ; but eventually the blood clots in some part of them, and the connective tissue and vessels contained in them hypertrophy. Usually a small artery lies in the centre. External piles vary greatly in appearance, according as they are swollen or contracted. In the former case they are almost globular and tense ; in the latter they may be so shrivelled up as to look like mere folds of thickened skin. Internal piles are classified into 1, longitudinal or fleshy, and, 2, globular. The former are usually 'blind,' that is, non-bleeding ; the latter are bleeding piles. The former are sessile and dusky ; the latter are more vascular, and therefore blue or red, and often pedunculated. The relative proportion of arterial, venous, and fibrous material in piles varies greatly. Superficial excoriation and ulceration common. Liability also to inflammation and strangulation. *Symptoms.*—Itching, irritation, and discomfort ; then tenesmus, pain in lumbo-sacral

region and in testicles ; irritability of bladder, disturbed nights, miserable bodily condition, and drawn-up countenance. When there is hæmorrhage to any extent, anaemia, sometimes to the utmost degree, ensues. Hæmorrhage often periodical: arterial or venous or capillary, trifling or moderate, or sudden, copious, and most injurious. Mucous or muco-purulent discharge. The latter indicates ulceration. *Complications.*—Fistula, fissure, prolapsus, and the various diseases which are so often the predisposing causes of the piles themselves. *Diagnosis.*—From prolapsus, polypus, and condylomata. *Vide* these diseases and compare symptoms. *Treatment.*—Remove cause if possible. Some cases obviously require operation ; others can plainly be cured by gentler means. In a third class of cases, milder treatment should be tried first, operation afterwards if necessary. General treatment: gentle exercise alternating with rest on a cool hard couch ; temperate diet ; gentle purgatives: confect. sennæ, sulphur, cream of tartar, Friedrichshall, Pullna, Hunyadi Janos, &c. Enemata of cold water. Confect. piperis. Conf. pip. should always be combined with or followed by a laxative. Tonics in suitable cases. Blue pill, taraxacum, &c., for the liver. Glycerine in 3j. doses. Hazeline. When the piles have been cured, but anaemia remains, give mist. ferri co. or pil. ferri carb. freely. Local treatment : I. Non-operative. Cleanliness, but avoid irritating soaps ; glycerine soap and warm water ; cold water. Hot water injections. Hazeline. If piles prolapse at stool, return at once. Ung. hydrarg. sub-chlor. Astringents : ung. gallæ co. Astringent injections. Quantity : two ounces nightly. Strength : tinct. ferri perchlor. m. x.-aquaæ 3j. Suppositoria acidi tannici. For *inflamed* piles : rest ; foment, poultice, leech the neighbourhood of the pile. When a large clot forms in a pile, incise pile and turn out clot. *Suppurating* piles : puncture when mature. *Strangulated* piles : reduce gently. Relieve pain on general surgical principles. II. Operative treatment : external piles are excised ; internal are removed by, 1, ligature ; 2, crushing ; 3, cautery ; 4, nitric acid ; 5, excision. *Excision of external piles.*—Seize with vulsellum-forceps, clamp, snip off with scissors curved on the flat, pass a cautery lightly over stump, unclamp,

snip off any pendulous little fold of skin ; pad of oiled lint ; **T**-bandage. *Ligature of internal piles*.—Let the nurse empty patient's rectum with an enema shortly before operation. Patient should sit over warm water to relax the parts and make it easier to protrude the piles. Position : on one side, knees drawn up. Seize each tumour with pile-forceps, cut through that side of it next skin with scissors, surround base of tumour with a hempen thread, tie the pile very tightly. Cut ends of ligature short, oil well, and push back the ligatured mass within the anus again. Ligature separates in about a week. An anodyne is to be given after the operation, and a laxative on the fourth day. Anæsthesia sometimes dispensed with. Dress with dry salicylated cotton. *Crushing*.—The *Lancet*, April 15, 1882, contains a detailed account of the method of operating with Benham's clamp. Apply clamp to base of pile ; screw tight ; cut off protruding part of pile. After a minute, gradually unscrew the clamp, 'at the same time particular care should be taken to press the jaws of the instrument well up against the buttocks, so that the surrounding tissues may not be unduly stretched,' which might cause hæmorrhage. *Cauterisation of internal piles*.—Preparation same as for ligature. Smith's clamp, ivory side downwards, snip off piles with scissors, sear bases with actual or with galvanic cautery. Latter said to cause least after-pain. Unclamp gradually, and cauterise any bleeding point. Suppository of morphia. Usual to anæsthetise during this operation. After-treatment same as for ligature. Recovery quicker. Danger about the same, but in either case very little. *Nitric Acid*.—Suitable for sessile hæmorrhoids. Apply with a piece of wood through speculum. Concave clamp to protect healthy mucous membrane. Galvanic cautery applied lightly answers admirably for sessile hæmorrhoids. *Excision*.—Whitehead, of Manchester, considers the usual methods of operating on piles to be not sufficiently in harmony with ordinary surgical principles. He cuts free the piles with scissors, leaving them attached only by their vessels (which of course enter from above). He then twists the pile till these vessels give way. Finally he closes the resulting wound by suture. See *B. M. J.*, Feb. 4, 1882.

Injection of piles with carbolic acid (C. B. Kelsey).

NOTE.—When operating for hæmorrhoids, avoid as much as possible damaging the line where the mucous membrane joins the skin. When there is a fissure, operate on it first. Also do not neglect to asepticise all instruments and ligatures. It is quite true that the parts are sure to get befouled with faeces; but the faeces are not particularly likely to contain those classes of bacteria which are specially inimical to wounds, and which may be harboured by any infected instrument or suture.

Hamstrings, Tenotomy of. *See BICEPS FEMORIS, TENOTOMY OF.*

Hands, Deformities of (inclusive of *fingers*).—Four classes, viz.:—1, deficiency, 2, excess, 3, webbed fingers, 4, contractions. It is rare to find a finger or any part of the hand congenitally deficient.

Supernumerary fingers are frequent: one is the common number, and it lies usually on ulnar side of little finger. Thumb may be bifid, or there may be a supernumerary thumb. A finger may be too long or too short. A very rare deformity is a double hand on the same wrist.

Contractions.—Four classes, 1, congenital; 2, paralytic; 3, traumatic or cicatricial; 4, rheumatic.

Congenital contraction assumes the form called 'clubbed hand,' which is analogous to clubbed foot, but very rare.

Dupuytren's contraction bends the fingers upon the palm, and is practically the most important deformity of the hand. **Causes.**—Occasionally chronic rheumatic diathesis, or the habit of pressing on some round-headed instrument, like a chisel or a walking-stick. **Signs.**—One or more fingers, especially the little one, is flexed, a tense subcutaneous fibrous band bridging across from it to the palm. **Pathology.**—Chronic inflammatory thickening and contraction of fibrous tissue between palmar fascia and sheaths of flexor tendons.

Treatment.—Supernumerary fingers should be amputated. As their proximal joint sometimes communicates with one of the normal metacarpo-phalangeal articulations, use antiseptics strictly.

Clubbed hand can be treated on the same principles as clubbed foot. Gymnastic methods essential.

Treat *Dupuytren's* contraction in this way. Divide, antiseptically, the contracted fibrous bands, carefully avoiding any injury to sheaths of tendons. Then extend fingers on a splint. Attend to the cause. Hardie (of Manchester) has a good paper on this subject in *Med. Chronicle* for Oct. 1884.

Webbed fingers, unless ingeniously treated, reunite after being cut apart. Method 1 : Pass a metal ring through the base of the web and keep it there till the aperture cicatrises. Then complete the separation. Method 2 : Wrap a flap of skin taken from the back of one finger over the raw surface of the other finger, and another flap of skin taken from the palmar surface of the latter finger over the raw surface of the former, utilising of course the skin of the web itself.

Hanging. *See ASPHYXIA.*

Hare-lip.—*Causes and Pathology.*—Congenital. Many degrees of this deformity. Single hare-lip and double hare-lip. The fissure is not central, but corresponds, in single hare-lip to one side, and in double hare-lip to both sides, of the intermaxillary bones. The intermaxillary are the bones which form the front of the hard palate and alveoli carrying upper incisor teeth. Hare-lips vary in depth from a mere notch in the edge of the upper lip to a total lateral separation of the intermaxillary bones. The deformity in hare-lip is homologous to a fissure which is normal in some fishes, but it has no homology with the cleft in the lip of the hare. It often co-exists with cleft palate. Male sex predisposes. Double hare-lip almost always affects boys, and is ten times less common than the single variety. The intermaxillary bones in double hare-lip often project forward from the end of the nose, and are frequently only half developed in size. *Treatment.*—Operative only. Best time, third to fifth month of infancy. When unassociated with cleft palate Owen recommends operation 'within even a few days of birth.'¹ Contra-indicated during dentition or ill-health. Plastic operations said to fail in syphilis (Verneuil). Chloroform unnecessary. If desired, anaesthetic vapour may

¹ *Surgical Diseases of Children*, p. 212.

be pumped through the catheter. Child in a lying or sitting position on a table or on nurse's or surgeon's lap. Secure his limbs by rolling him up lightly but firmly in a towel. Assistant to check haemorrhage by holding each side of the upper lip between his finger and thumb. Surgeon sponges for himself, or lip may be secured in T. Smith's forceps. Begin by separating, with the knife, the two sides of the lip from the jaw subjacent, unless the former structures be already very free. Then pare the edges of the cleft. Remove enough, especially from the apex of the cleft, and from the junction of the cleft with the edge of the lip. Then suture, strap, and put on Hainsby's truss. The incisions are best made with a view to utilising the 'parings' of the fissures, especially with a view to counteracting the effect of the contraction of the cicatrix, which tends to cause a notch in the edge of the lip. *Vide* diagrams in text-books. In double hare-lip the whole margin of the intermaxillary nodule is pared. When this nodule projects it must be broken at the base and bent back to the level of the lip. Modes of suture. 1. The 'hair-lip' suture proper. Two pins. Enter and exit $\frac{1}{4}$ -inch from fissure, pass deeply, nearly reaching mucous membrane. Lower one secures coronary artery. Twisted suture. Interrupted wire suture at red border of lip. Sharp ends of pins nipped off. Pieces of lint placed beneath ends of pins. Strapping, broad at ends and narrow in middle, brought across lip. 2. The common interrupted wire suture. All pins should be removed on fourth day very gently, the lip being well supported at the time and strapped immediately afterwards. Act of suckling rather beneficial than otherwise, as it tends to close the fissure. In order to bend back the intermaxillary bone when it projects, instead of breaking its base it is sometimes a better plan to cut a V-shaped piece out of the septum nasi.

Head, Injuries of the. -Particularly important because almost all varieties are liable to be complicated with cerebral mischief. *Classification* is primarily anatomical. 1, scalp injuries; 2, fractures of skull; 3, injuries of brain and its membranes; 4, injuries of cranial nerves.

I. Scalp may be contused or wounded, or both. **CONTUSIONS OF SCALP.**—Very common. Extravasation may be diffused or circumscribed. Circumscribed extravasation occurs either, 1, above cranial aponeurosis, or 2, between pericranium and bone. Diffuse extravasation generally lies between epicranial aponeurosis and pericranium. Sutures may limit subpericranial extravasations. A special kind of scalp extravasation is *Cephalhæmatoma*, which lies mostly just beneath epicranial aponeurosis and very rarely beneath pericranium. *Signs.*—Fluctuation, hard and thickened margin, soft centre, rarely any discolouration. *Cephalhæmatoma* occurs in the newly born, and is caused by pressure of maternal passages or of obstetric forceps. Its usual situation is over the parietal bone. *Fluid contents.*—Blood with its corpuscles more or less disintegrated, its colouring matter more or less diffused and perhaps partly crystallised, while its plasma is often partly coagulated. The coagulation may entangle the colouring matter and leave the fluid contents pale and yellow. *Diagnosis.*—From fracture. The hardened margin of an extravasation can usually be deeply pitted by steady and continued pressure. See *Fractures* (next page).—*Treatment.*—Cold and pressure. Afterwards discutient lotions (Iotio ammonii chloridi, &c.) Only the most obstinate cases should be aspirated or punctured by a small knife. After puncture apply antiseptic dressings. When suppuration occurs, open freely and disinfect with iodoform and bismuth. *Scalp, wounds of.*—Often contused and lacerated. *Prognosis.*—Very good even in the most severe cases, because the vessels of the scalp lie chiefly superficial to the aponeurosis. But, for the same reason, the blood-supply of the cranium is sufficiently interrupted in extensive lacerations to cause danger of necrosis with its consequences. Other dangers in scalp wounds are erysipelas, and accumulation of pus, causing puffy swelling. *Treatment.*—Clean and asepticise most carefully and replace flaps accurately. Use sutures if necessary, but provide for drainage. Dressing should be aseptic and just enough to support and protect from draughts of cold air without heating. Scalp wounds should be dressed antiseptically. They should be drained towards the back of the head, not only on account

of gravity, but because anteriorly the extent of the dressing is limited by the nostrils if not by the eyes. Bleeding vessels can sometimes be conveniently secured between a needle and twisted suture. Treat complications on general principles, giving free exit for pus, &c.

II. FRACTURES OF SKULL.—Classified in three ways. First, into simple and compound. Secondly, into fractures of the vault and fracture of the base. Thirdly, according to the physical characters of the fracture, into fissures, starred, depressed, punctured, elevated, and comminuted fractures. It should also be noted, when possible, what is the relative amount of damage done to the inner and outer tables of the skull. *Causes.*—Blows and falls on the head, and, though very rarely, indirect violence, viz., falls on the feet or blows on the lower jaw. The nature of the fracture naturally depends greatly on the cause. *See Pathology following. Anatomy and Pathology.*—Position of fracture. This depends chiefly on point where the causative force has been applied, and on nature of force. Sharp instruments cause depressed fractures at the point of contact. Sometimes they only crack the outer table, while they depress the inner. Heavy, softish bodies, *e.g.* a bale of cotton, are likely to cause fractures of the base. The skull has been divided into three 'zones,' and evidence given to show that a blow on the vault of one zone is likely to cause a fracture of the base of the same zone. The middle zone consists of 'the parietals, the squamous, and the anterior surface of the petrous portions of the temporals, with the greater part of the basi-sphenoid.' The posterior and anterior zones include the rest of the skull. The middle zone is the commonest seat of fracture. Shape of fractures: *vide* classification. A very common shape is a depression with three triangular sides sloping downwards till their apices meet in the centre of the depression. In fractures of the base, sutures—*e.g.* the petroso-occipital—are sometimes torn open. Most fractures of the base are continuations or fissures of some part of the vault. But a few appear to be genuine cases of *contre-coup*. This is what is meant by *contre-coup*: Suppose a watch lying with its face towards the table and a weight to fall upon the back of the watch. If the glass

cracked, that would be a fracture by *contre-coup*. In some of these cases, the base of the skull is said to be broken by concussion with the atlas. One table is usually more damaged than the other, and the least damaged lies towards the surface where the violence has been applied ; therefore the most damaged is almost always the inner table. Extravasations within the cranium, damage to internal and middle ears, and to cerebral centres and nerves, as well as membranes of brain, very common. *Signs and Diagnosis.*—Obvious in compound fractures with depression. In compound fractures without depression, fissure looks like a red line. One of the sutures must not be mistaken for a fissure. Simple fractures without depression can only be recognised or suspected indirectly through their complications. Simple fractures with depression have to be distinguished from contusions with thick, hard margins. The depression in fracture is generally more abrupt at one part of its margin than another, while the hard margin of a contusion is usually tolerably circular and uniform, as well as impressionable by steady pressure with the finger. Fractures of frontal sinuses, or of mastoid cells, often cause emphysema. *Signs of fracture of the base of the skull.*—Bleeding from ear, nose, or mouth, escape of cerebro-spinal fluid from the ear,¹ sub-conjunctival ecchymosis, paralysis of cranial nerves, especially of the seventh pair. Tenderness of mastoid process and ecchymosis in sub-occipital region indicate fracture of posterior fossa, unless direct violence has been applied to the tender and bruised parts. The anatomical explanation of the above symptoms is obvious. Hæmorrhage from the ear is the commonest of them. A somewhat rare symptom of fractured skull is escape of brain-matter. Cerebro-spinal fluid is very watery, saline, and contains only a trace of albumen, and the faintest trace of sugar. When such a fluid escapes from the ear directly after an injury, it is pathognomonic of fracture of the base. Amount of fluid sometimes very considerable.² In diagnosing fracture of the skull,

¹ In rare cases, cerebro-spinal fluid has been known to flow from nose or from a fracture of the vertex.

² E. W. Collins (*Dub. Med. Journ.*, Feb. 1877) demonstrates that (1) sugar is not constant in the fluid ; (2) when present, though reacting to Trommer's, Moore's and Böttgen's tests, it usually does not deflect polarised light, or fer-

always consider the brain-symptoms, if such are present, and consider also the nature of the force which caused the accident. Serious and long-continued cerebral symptoms following a heavy blow on the head are usually caused by fracture and its complications. *Prognosis.*—Depends usually altogether upon the amount of injury done to the brain or its membranes, upon the quantity of intracranial haemorrhage ; and, if there be a wound, upon its remaining aseptic. Consider the cause, the situation, and the shape of the fracture, the age, habits, and health of the patient. The injury done by sharp instruments is generally local and pretty manifest to the surgeon's senses. Heavy, blunt, soft bodies are apt to severely concuss and contuse the brain, and fracture the base of the skull, whilst causing very little superficial damage. Fractures of the base are usually, but not always, fatal. Fractures with escape of brain-matter have been recovered from. Fracture at root of nose may only affect anterior wall of frontal sinus. Young children have no frontal sinus. Depressed, and especially punctured fractures, very liable to wound dura mater and brain. When large pieces of the cranium have to be removed, there is danger of ultimate appearance of hernia cerebri or cephalhydrocele (*see p. 95*). *Treatment.*—In all cases, rest, coolness, low diet, high, hard pillows beneath head. Ice locally, a purgative at commencement. Vigorous antiphlogistic treatment *the moment signs of inflammation appear*. Leeches. Cold douche.¹ Continue observation of simple cases at least a month. Cleanse and asepticise rigorously and minutely. Provide for drainage. When auditory or nasal passages are opened (as shown by haemorrhage from ear or nose) insufflate iodoform ; keep the external auditory meatus full of that

ment with yeast ; (3) three *constant* characters of cerebro-spinal fluid are—(1) very low sp. grav., (2) almost complete absence of albumen, (3) comparatively large proportion of sodium chloride.

¹ By far the most powerful and effective way of applying cold to a critical head-case ; but much neglected in surgery. A patient with severe head-injury should be attentively and frequently watched, as the first symptoms of cerebral irritation, *e.g.* convulsions, are the most valuable indication of the localisation of the injury ; also the temperature should be taken frequently, *e.g.* every three hours, as an ominous rise may be sudden and rapid. Dr Robertson (Glasgow) thinks an intelligent observer should be in *constant* attendance on such cases. For instructive examples, see Macewen, *Lancet*, vol. ii. 1881, and Chiene, *Edin. Med. Journ.*, May, 1882.

powder. Remove loose, depressed pieces in comminuted fracture. *Indications for Trephining.*—They are the occurrence and persistence, in spite of treatment, of symptoms of local intracranial suppuration, or haemorrhage, or of cerebral irritation, after a blow on the skull. Trephining is, as a rule, contraindicated in cases of diffused injury to the brain, and even in some cases of depressed fracture unattended by cerebral symptoms. Perhaps depressed bone by itself seldom gives rise to marked symptoms of compression. However, much must depend on the degree, character, and position of the depression. When there is a depressed fracture, it is at all events right to trephine as soon as ever cerebral symptoms appear. When there is comminution, depressed pieces can sometimes be raised by the elevator or forceps only. When we consider the enormous intracranial haemorrhages from which patients are known to have recovered, it is not likely that ordinary depressed fractures often prove fatal otherwise than by exciting inflammation.¹ *See article TREPHINING.* Further points are touched upon in the next section.

III. INJURIES OF THE BRAIN AND ITS MEMBRANES.—These include extravasations of blood within the cranium, contusion and laceration, inflammation and suppuration of traumatic origin, hernia cerebri; and here also must be noticed the conditions styled 'concussion' and 'compression.'

Extravasation of Blood within the Cranium.—1, between dura mater and bone; 2, in cavity of arachnoid; 3, on the surface of the brain between it and the arachnoid; 4, in the substance of the brain or in its ventricles. 1. Extravasation between dura mater and bone. *Causes.*—Wounded blood-vessel, usually a branch of middle meningeal artery, sometimes a wounded sinus, especially the lateral sinus. *Pathology.*—The effused blood forms a clot, often of enormous size and having very little tendency either to be absorbed or to become encysted. This clot, when large, causes a corresponding depression on the surface of the brain. *Signs.*—May be almost *nil* if clot be small, or even in the case of a large haemorrhage, if it be poured out so gradually that 'the brain has time to

¹ See on this subject, Duret on Cerebral Traumatism.

accommodate itself to the pressure.' A given quantity of effusion between the dura mater and the cranium causes far more severe symptoms than an equal amount in the cavity of the arachnoid, because the latter is more diffused (Duret). When symptoms are present they are those of compression or of irritation. The most valuable evidence of extravasation exists when symptoms of compression come on, not immediately after an injury, but after an interval of consciousness. The situation of an injury may point to a wound of a certain artery or sinus. The middle meningeal is the commonest source of serious haemorrhage.¹ For prognosis, treatment, &c., see paragraphs about *Compression*. It is to be noted that irritation of the nerves of the dura mater causes reflex convulsions and contractures of the same side of the body as the injury to the head. 2. Extravasation in cavity of arachnoid. Very common. *Pathology*.—When not absorbed has a tendency to form blood-cysts contained in a new fibro-serous membrane which is attached to the parietal layer of the arachnoid, and makes a depression on the surface of the brain. *Signs and diagnosis*.—Cannot be distinguished from other intracranial haemorrhages. Long after the original injury, it is liable to cause headaches and mental irritability. *Treatment, &c.*, see *Compression and Cerebral Irritation*. 3. Extravasation on surface of brain, beneath visceral arachnoid. Accompanies general cerebral injuries. Never encysted. May spread very widely. No special signs. No special treatment. 4. Extravasations into substance of brain or into its ventricles. Not to be distinguished from apoplexy except by the history. *Treatment, &c.*, as in Apoplexy.

Contusion and Laceration of Brain.—Pathological Anatomy. Minute extravasations, sometimes few, sometimes numerous, sometimes occupying only a limited portion of grey matter, sometimes diffused through greater part of brain; sometimes attended with very little injury to cerebral substance, sometimes followed by complete softening and disintegration, or, after a longer interval of time, by atrophy of

¹ 'Middle Meningeal Haemorrhage.' Elaborate article by Jacobson in *Guy's Hospital Reports*, 1886.

brain-substance. Situation often opposite the part of cranium struck (*contre-coup*). Usually middle or anterior fossa of base. Lacerations are often complicated with large extravasations. *Symptoms*.—Partial spasms and paralysis, occasionally coma. Frequently concussion. None of these symptoms belong specially to cerebral contusion and laceration, which are so difficult to diagnose satisfactorily that their *treatment*, &c., will best be considered under the heads of concussion, compression, cerebral inflammation, irritation, &c.

Encephalitis, Traumatic.—This includes meningitis, for, during life, inflammation of the membranes cannot be diagnosed from that of the brain-substance ; though a shrewd guess may sometimes be formed by considering the exciting cause. Classified into 1, acute, and 2, sub-acute or chronic.

Causes.—All injuries of the head. For even a scalp wound may excite first, osteitis, and secondarily, meningitis and cerebritis. Neglect of rest and of temperance after head-injuries is very likely to excite inflammation. *Pathology*.—Congestion of the parts inflamed. First, yellowish lymph and then pus appear on the inflamed membranes. Cerebral substance may soften and break down. Serous effusion into ventricles. When the exciting injury is not very deep—*e.g.* most punctured fractures—the membranes are chiefly affected ; but when it is general or deep—*e.g.* contusion of brain—the cerebral substance may be the chief seat of inflammation.

Although the appearances are most marked at the actual seat of injury, yet traumatic encephalitis generally spreads to a great part of the brain and its membranes. In chronic cases, parietal and visceral layers of arachnoid cohere. The amount of cerebral congestion is estimated *post mortem* by the number and size of the red points visible on section of the hemispheres. This test is not satisfactory, for it is influenced by the relative fluidity of the blood and the pressure of serous effusion in the ventricles. *Signs*.—1. Acute. Severe pain in head, over-sensitiveness to light and sound, noises in ears, one or both pupils contracted, partial spasms and paralyses, epileptiform convulsions, usually, or at all events at first, unilateral ; fever, pulse frequent or variable, temperature raised slightly

at first, and raised more if suppuration come on. *Vomiting.* Delirium. Lastly coma, and death by exhaustion and compression. The relative prominence of the symptoms catalogued above varies greatly in different cases. In comatose stage pupils eventually dilate. 2. *Chronic.* When it comes on long after receipt of injury, there may be premonitory signs, *e.g.* irritable temper, headaches, &c. The symptoms differ only from those of acute inflammation in being less concentrated and severe. *Diagnosis.*—Traumatic intracranial inflammation can scarcely be confounded with any other disease if its causes and signs are carefully considered. *Prognosis.*—Very serious, especially if not treated promptly and boldly. *Treatment.*—Cold locally, purging, calomel, venesection, leeching, morphia. Venesection rarely used now. Leeching over temples and mastoid processes very beneficial. But local cold is the most powerful remedy. The cold douche is the most effective form, and it should be used courageously and perseveringly. Ice-bags. Purging is highly praised. Calomel and butter placed on tongue. Small doses of calomel and morphia sometimes given, especially when furious delirium comes on a few days after a head-injury. Dark room, head raised on high hard pillows, hair cut short. For treatment when suppuration supervenes see following paragraph. Many cerebral inflammations which have resulted from wounds would have been prevented by antiseptic precautions.

Intracranial Suppuration.—Within the skull, as elsewhere, suppuration is one of the 'terminations' of inflammation; it is practically very important whether the pus be between the skull and dura mater, just beneath the dura mater, or within the brain-substance. *Signs.*—Not decisive. Symptoms of compression gradually coming on during encephalitis, and accompanied by further rise of temperature, and rigor. At the same time a co-existent scalp wound may become pale and dry, or Pott's puffy swelling may form. If the wound be deep enough, the bone may perhaps be seen exposed by separation of pericranium. When these local signs are present, it is not unlikely that the pus is lying just beneath that part of the skull. *Prognosis* very bad; to make it worse, pyæmia is a not

unfrequent complication. *Treatment*.—The main question is that of trephining. Difficulty of treatment consequent on difficulty of diagnosis. When above symptoms are well marked, trephining is clearly indicated, more especially if the seat of disease can be localised. If the brain is not found pulsating beneath the exposed dura mater, that membrane may be punctured. (See also 'Brain, Abscess of'.)

HERNIA CEREBRI.—*Causes*.—Wound of skull and dura mater, followed by inflammation of part of brain immediately beneath it. More common in children, and when aperture in skull is small than when it is large. *Pathology*.—Inflammatory proliferation of connective tissue of brain, leading to a hernia of a substance whose structure is sometimes entirely like that of granulation-tissue, brain-substance and clotted blood, and sometimes of blood-clot only. *Signs*.—Hernia usually appears a few days after injury, but may appear much later. Brown, or reddish-brown mass, pulsating synchronously with respiration, and increasing in size. Brain symptoms, sometimes very slight at first, are those of cerebral irritation and inflammation. In fatal cases, death ensues from the encephalitis. *Prognosis* bad. *Diagnosis*.—From fungus of dura mater and fungus of cranium. Former appears gradually, and is preceded by no fracture from external violence; latter does not pulsate. *Cephalhydrocele* (*q.v.*) may be regarded as a form of hernia cerebri. *Treatment*.—Protective and slightly compressive. Shaving off is said to be contra-indicated; but Maclarens of Carlisle, successfully treated a case by shaving off, and then placing a silver plate inside the skull so as to block the opening. (*Lancet*, March 20, 1886.) A hollow metal cap fitting accurately. Any ordinary dressing, combined with compression by a soft pad and bandage.

CONCUSSION AND COMPRESSION OF BRAIN.—'Concussion' and 'Compression,' two terms which represent each a peculiar and important assemblage of symptoms, rather than a definite pathological state. Persons suffering from concussion are, in common parlance, said to be stunned. Compression means a more alarming condition, in which the patient cannot be

CONCUSSION.

1. Insensibility, from which patient can usually be partly aroused.
2. Respiration feeble, like that of a person in a faint condition.
3. Pulse weak, irregular, and often frequent.
4. Special senses dulled.
5. Pupils variable, but usually sensitive to light.
6. Nausea as recovery is taking place.
7. Bowels relaxed, but sphincters not paralysed.
8. Bladder can expel water.
9. Comes on instantaneously and passes off gradually.

COMPRESSION.

1. Total insensibility.
2. Respiration stertorous, slow, and puffing.
3. Pulse full, slow, laboured.
4. Special senses paralysed.
5. Pupils widely dilated, or sometimes one dilated and the other normal or contracted.
6. Stomach insensitive.
7. Sphincters may be paralysed, but bowels are torpid.
8. Bladder sometimes paralysed. Consequent retention of urine.
9. Does not usually appear at moment of injury, but afterwards, and often tends to get worse.

Treatment of Compression varies with the suspected or known cause, whether extravasated blood, or depressed fracture, or inflammation, or suppuration, or foreign body. But always attend to these points—1, dark room ; 2, high head ; 3, head shaved ; 4, head cool ; 5, low diet ; 6, see that the bowels act freely, if necessary placing a drop of croton oil in a little sugar on the tongue. The treatments of inflammation and suppuration are given above. The question of trephining for compression has been answered in the affirmative or the negative, according as the intracranial mischief is believed to be local and accessible, or to be general. But the introduction of the antiseptic treatment re-opens this question, and antiseptic trephining may be justifiable to relieve general intracranial tension.¹ I must again also call attention to the power of the cold douche long continued, *e.g.* for hours, over intracranial inflammations.

General Cerebral Irritation.—Pathology.—Probably laceration of brain. *Symptoms.*²—Graphically described in Erichsen—1, bodily ; 2, mental. Bodily : attitude of general flexion—knees drawn up, elbows bent, &c. ; restlessness ; eyelids firmly closed ; no heat of head ; pulse weak and not frequent ; rarely retention. Mental : irritable temper, desire to be let alone ; muttering, frowning, grinding of teeth if disturbed. When these symptoms subside, the mind may be left

¹ See Yeo, *Brit. Med. Journ.*, May 14, 1881.

² Not unlikely that the peculiarity of this set of symptoms is due rather to the part injured than to the kind of injury.

for a long time weak and fatuous. *Treatment.*—On general principles ; rest, darkness, quiet, coolness, ice-bag, patience. Chloral and even morphia may be given in some cases ; but their effects should be keenly and cautiously watched.

INDICATIONS FOR TREPHINING.—(1) Whenever there is reason to attribute the compression to haemorrhage between the brain and the skull (whether sub-cranial or sub-dural) ; (2) whenever the symptoms point to abscess ; or to (3), even diffuse inflammation if due to depressed or punctured fracture or gunshot wound. It is of no consequence whether the fracture be simple or compound.

As a rule operate at the seat of the original injury. But extensive fissures, starting elsewhere, sometimes cross the course of the middle meningeal artery, lacerating it. In such cases there is a seat of election. See *Arteries, ligature of* (middle meningeal.) The common carotid has also been tied for severe haemorrhage from the auditory meatus, due to fracture of the base.

In connection with injuries of the head should be noted the occasional permanent loss of memory of the incidents of a few days preceding the injury. Refer to pamphlet by Joseph Bell (Edinburgh : Oliver and Boyd, 1883).

IV. INJURIES OF CRANIAL NERVES.—*Causes.*—Fractures of bones of skull, extravasated blood, inflammatory effusion. *Signs.* May be deduced from consideration of functions of these nerves. Paralysis in most cases, spasms in some. Disturbed nutrition of cornea and conjunctiva when fifth nerve is injured. *Prognosis.*—Usually unfavourable ; but when the paralysis or spasms come on during attacks of intracranial inflammation, recovery may take place on absorption of inflammatory effusion. *Treatment.*—If possible, remove the cause. Nerves most frequently affected are seventh and second pairs.

To complete these notes on injuries of the head, we must notice traumatic osteitis of the cranial bones, which when acute is usually called 'inflammation of the diploe.' Chronic osteitis of cranium follows any injury (of course it is sometimes syphilitic) ; it may result in hypertrophy, caries, or

necrosis. Acute inflammation of cranium is very dangerous, from its liability to spread to membranes of brain.

LOCALISATION OF CEREBRAL INJURIES.—This is of great importance with regard to the question of trephining, and now, thanks especially to Ferrier, not so difficult as formerly.

The anterior and greater part of the frontal lobe may suffer terrible injury without either paralysis or loss of consciousness ensuing, provided only that the posterior part of the left third frontal convolution escape. Damage to the latter causes aphasia.

The bases of the three frontal convolutions, with the convolutions bounding the fissure of Rolando,¹ constitute *the motor area*, the lesions of which have very determinate signs, valuable to the surgeon. Destructive injuries to this region cause paralyses, irritative produce convulsions and contractures. The effects, with excessively rare exceptions, are on the side opposite to the injury.

Extensive injuries of the motor area cause hemiplegia of the opposite side. If there is a precedent inflammatory stage, it is marked by spasms of the parts afterwards paralysed. If the injuries in the cases in question are purely cortical, there is no affection of sensation. The hemiplegia, at first absolute, tends to gradually disappear as regards 'associated, alternating or bilateral movements.' Hence the hand is more paralysed than the arm, the arm more than the leg, and the lower facial

¹ The fissure of Rolando runs up, not quite parallel to the coronal suture, *i.e.* $1\frac{1}{2}$ to 2 inches behind it above, and about $1\frac{1}{4}$ inch from it below. The upper end of this fissure lies almost perpendicularly above the external auditory meatus. In locating the convolutions and fissures, the alveolo-condyloid line is the best primary or base line to adopt. It passes horizontally through the bases of the upper incisor teeth and the lowest part of the occipital bone, crossing the middle of the mastoid processes. The bregma, or point of intersection of the sagittal and coronal sutures, is touched by a line carried perpendicularly upwards from this base line through the middle of the external auditory meatus. According to Thane the bregma is $\frac{1}{2}$ inch posterior to a point midway between the root of the nose and the occipital protuberance.

The upper end of the fissure of Rolando is 5 centimetres behind the bregma; its lower end is .5 centimetre behind the auriculo-bregmatic line, and .25 centimetre above a line drawn from the superciliary ridge parallel to the base line. It is a good plan, when about to operate, to mark, with silver nitrate, the position of the fissure of Rolando on the shaved and asepticised scalp.

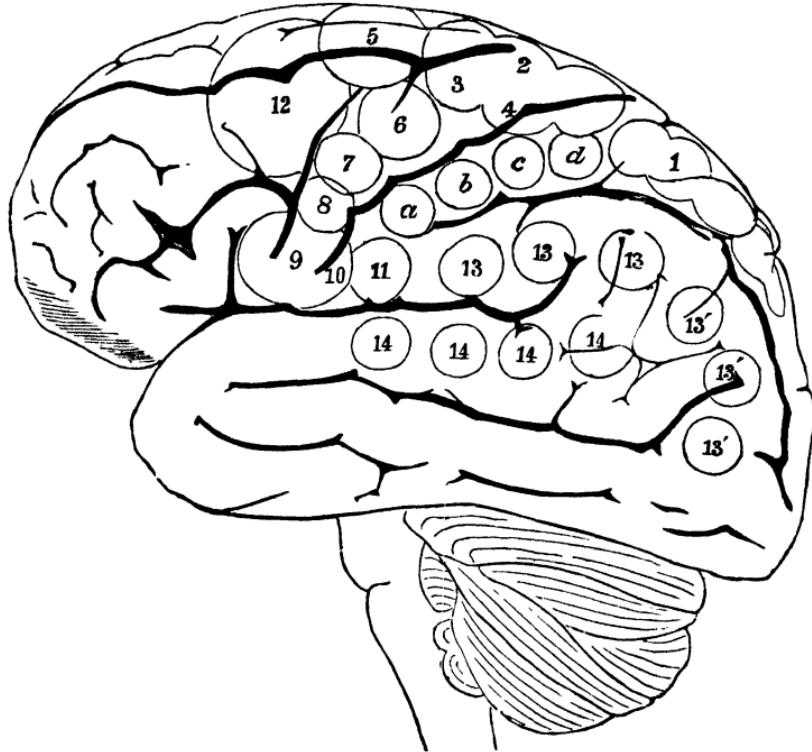
In determining the above landmarks, a draughtsman's square of flexible metal, with a plug at the intersection of its arms to fit into the meatus, is useful. (Broca and Lucas-Championnière.)

movements more than the upper. But these differences are not noticed at the first onset.

Lesions of the base, resulting from concussions, may complicate and obscure the diagnosis.

Lesions of the centrum ovale have exactly the same effect as those of the corresponding cortical regions.

Partial lesions of the motor area.—These may cause func-



tional disturbance of the whole of it, and therefore complete hemiplegia. But even in these cases the *earliest* signs of injury usually point clearly to a more definite localisation. Hence the importance of watching constantly a case of head injury.

Conjugate deviation of the eyes and turning the head to the opposite side, with elevation of the eyelids and dilatation of the pupils, point to irritation of the base of the first frontal and neighbouring part of the second frontal convolution (12).

The leg-centre is situated about the upper extremity of the fissure of Rolando (2).

In exceptional cases, local and general spinal paralyses may result from the effect on the spinal cord or medulla oblongata of sudden displacement of cerebro-spinal fluid due to blows on the head.

Areas 4, 5, and 6 are centres for movements of the arm. Areas *a*, *b*, *c*, and *d* are associated with movements of the wrist and fingers. Note their proximity to the facial and oral centres (7 to 11). Brachial monoplegia is less frequent than brachio-facial paralysis. 4 is the centre for adduction and retraction of the arm, 5 for forward extension, 6 for supination and flexion. It will be noticed that these and the other arm centres lie in the ascending parietal and upper part of the ascending frontal convolutions.

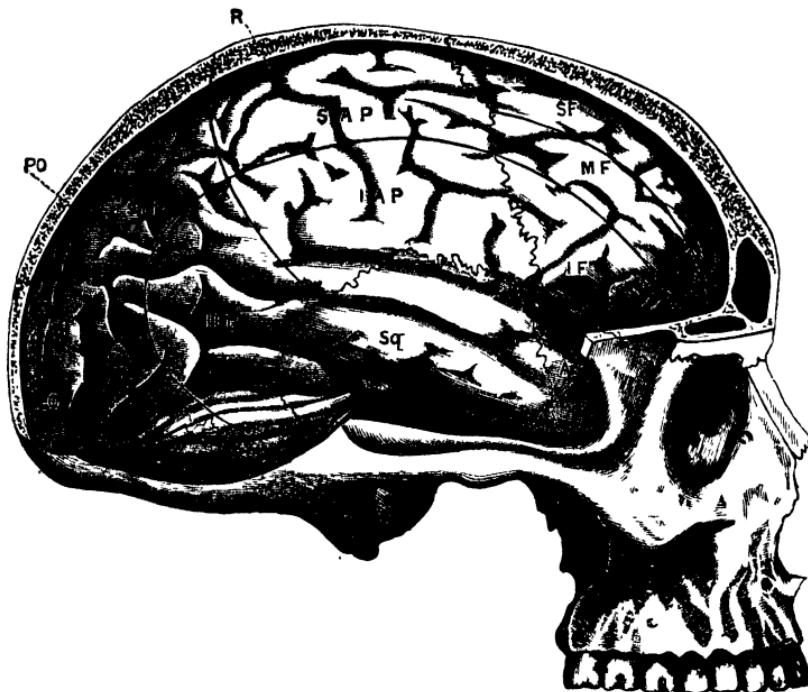
Combined arm and facial paralysis, often associated with aphasia if the right arm be affected, results from lesions of the middle or lower third of the ascending convolutions (about 7, 8, 11).

Aphasia points to injury of the posterior part of the inferior frontal convolution and lower end of the ascending frontal (9, 10).

Diagnosis of Cortical Paralysis.—Apart from the consideration of the cause, &c., there are no features distinguishing hemiplegia due to general destruction of the motor area of the cortex from hemiplegia due to destructive lesions of the corpus striatum. In each case those movements are most paralysed which are most volitional. Sensation is not affected if the lesion be strictly limited to the cortex or to the anterior two-thirds of the internal capsule. The nutrition or electric contractility of the paralysed muscles is not directly impaired. There is a tendency to the development of descending sclerosis of the motor tracts of the crus, pons, medulla, and spinal cord, and the appearance of late rigidity or contracture of the paralysed limbs.

There is said to be less difference in the temperature of the two sides of the body when the hemiplegia depends on cortical than when it is the result of central disease.

Hemiplegia, however, is not the most common type of the former, but more frequently a succession of dissociated paralyses or monoplegia. A monoplegia advancing progressively towards a hemiplegia is very significant of cortical disease. Monoplegia is very frequently associated with monospasm or early rigidity of the paralysed limb, or of the muscles governed by the centres surrounding the lesion. Cortical paralyses are



From Ferrier, after Turner.¹

frequently erratic and transitory. Early rigidity, so frequent with cortical lesions, is rare in central cerebral disease. Consciousness is comparatively less frequently lost in cases of sudden cortical lesion. There is frequently localised pain in the head.

Irritative Lesions of the Motor Area.—These are such as

¹ To show the relations of individual convolutions and fissures to the skull and its sutures.

cause convulsions. Unilateral convulsions do not necessarily signify irritation of the motor area. Long-continued irritation of any other part of the hemisphere may cause them. But monospasms and convulsions which begin invariably in the same way and do not cause loss of consciousness, and which are followed by paralysis more or less permanent, indicate an irritative lesion of the motor area.

An irritative, as compared with a destructive lesion, can only be localised approximately. An irritative lesion of one centre may 'discharge' neighbouring centres. Hence 'the march' of the spasm should be minutely investigated in each case, the first convolution in a given attack possibly indicating the exact cerebral locality.

Lesions of the Sensory Regions.—Complete unilateral hemianæsthesia (affecting all the organs of sense of the corresponding side) points to lesion of the posterior part of the internal capsule (of the opposite side). As regards vision in these cases, the eye is rarely quite blind. There is rather a condition of amblyopia and a remarkable contraction of the field of vision.

Bilateral hemiopia may mean a lesion of one optic tract or of the corpora geniculata or the posterior part of the optic thalamus, and several cases have been reported of late in which abscesses affecting the medullary fibres of the posterior lobes have been associated with hemiopia. Defect of the right halves of the field of vision of both eyes means injury to the left occipito-angular region, and *vice versa*. Lesions of the occipital lobes are often latent; but the occipito-angular region is the *visual centre*, though there is yet some dispute as to the exact relations to vision of the angular gyrus and occipital lobe respectively.

The angular gyrus is marked 13, 13'.

The *auditory centre* is in the superior temporo-sphenoidal convolution (14). Defects of one ear correspond to injury to this convolution on the opposite side.

The *olfactory centre* lies in the lower extremity of the temporo-sphenoidal lobe. 'Destruction causes no motor paralysis, but is followed by loss of smell on the same side; and,

when the lesions invade not merely the subiculum (cornu Ammonis) but the neighbouring regions on one side, *taste* also is affected on the opposite side of the tongue.'

Tactile sensation is probably located in the region of the hippocampus and uncinate gyrus.

It is to be borne in mind how easily sensory defects are overlooked unless carefully searched for.

Cortical lesions do not seem to cause deafness or blindness in the sense of 'actual insensibility to optical or auditory stimuli of a complete or enduring character,' but rather '*subjective* deafness and blindness, or abolition of visual or auditory perception or discrimination.' The conditions have been called by Kussmaul, 'word-blindness' and 'word-deafness.' The former means inability to translate written symbols into ideas ; the latter, to understand spoken words.

It is important to note that, corresponding sensory centres on the right and left sides of the brain being not always symmetrically developed, the effects of injury may vary greatly with the side affected.

According to J. B. Roberts, recent observations tend to localise *general sensation* as follows :—

The sensory area for the *leg*, } probably } behind the fissure of Rolando in
That for the *arm*, } lie } the parietal and ascending parietal
" " " *face*, } convolutions;

the three lying one above the other in the order named. The sensory and motor areas seem to, as it were, overlap or fade into one another.

Lesions of the Occipital Lobes.—These are often latent. It has, however, been stated that they cause a tendency to acute sloughing over the sacrum. Occasionally there occur cutaneous formication and similar subjective sensations. It is probable that mental disturbances are somewhat frequently associated with the lesions under consideration.

According to Charcot, the cortical centres are not distinctly defined and differentiated in infancy.

Upon the whole of this subject, refer to Ferrier on *The Localisation of Cerebral Disease*.

Heart, Injuries of. See INJURIES OF CHEST.

Hernia.—This word, which probably is derived from the Greek *ernos*, a shoot, is applied to the projection of a viscous through the wall of any of the body-cavities, *e.g.* hernia cerebri, hernia of lung ; and, by extension, it is given even to such phenomena as bulging of tunica intima of an artery through an opening in the media and adventitia. But ‘hernia’ used without qualification refers only to hernia abdominalis.

Causes.—*Predisposing* : 1. Sex, four times as often in males as in females. 2. Age : variety of hernia depends greatly on this. 3. Occupation, habit of making violent efforts. 4. Hereditary conformation, including patent tunica vaginalis funiculi, abnormal laxity of mesentery, congenital defects of abdominal walls. 5. General weakness of the system. 6. Excessive obesity and flabbiness. 7. Pregnancy. 8. Defects in abdominal wall of traumatic origin, cicatrices, &c. Observe that No. 4 includes three causes.

Exciting Causes.—Sometimes a strain or violent efforts often repeated. Cough. In male infants, the application of a truss to an umbilical hernia may, it is said, produce an inguinal hernia.¹ Phimosis and tight clothing, possibly.

Symptoms.—In earliest stage, merely ‘weakness’ locally, with slight fulness in erect position and impulse on coughing. Then a soft round or oblong tumour develops, reducible generally with a gurgling noise. If containing omentum it is called an ‘*epiplocele*,’ and may be hard and lobulated. Herniae are opaque (except occasionally in the case of infants), and dull on gentle percussion. Mode of appearance and growth, usually sudden in ‘congenital’ hernia, gradual in other forms.

A hernia passes by a broad neck into the abdomen. Subjective signs are dragging pains and dyspeptic feelings. Herniae are often irreducible. *Anatomy.*—A hernia consists of (1) contents, (2) sac, (3) coverings. Contents : intestine, omentum, or, more rarely, one or the other abdominal or pelvic viscera, *e.g.* ovary, stomach, gall-bladder. Fluid between sac and contents, variable in quantity. An ‘enterocele’ contains

¹ I feel inclined to doubt this, as I find that in most cases of combined umbilical and inguinal herniae, the latter has appeared before any appliance has been placed on the former.

bowels only, an 'epiplocele' omentum only, an 'entero-epiplocele' both. Sac : is continuous with peritoneum. It is identical with tunica vaginalis in 'congenital' hernia ; but, in other cases, is formed by gradual pushing out of a pouch of peritoneum. It consists of a mouth, neck, body, and fundus. Mouth and neck are originally puckered ; but, with time, this puckering obliterates, and, still later, the neck and mouth are apt to thicken and contract. Hence many cases of strangulation. If a hernia be reduced before its sac has had time to grow old, thickened, and adherent, the sac, if small, may be drawn up into the general peritoneal lining of the abdomen again. *Diagnosis*.—See special varieties of hernia, especially inguinal and femoral. *Prognosis*.—In spite of the regular use of trusses, acquired hernia usually persists throughout life. Good prospect of recovery in congenital hernia of infants, and in slight inguinal herniæ, especially if promptly, patiently, and persistently treated. Congenital herniæ are most liable to strangulation, irreducible herniæ to obstruction. Umbilical herniæ of women may attain enormous size, especially in fat flabby women. So also may other herniæ, if neglected. *Treatment*.—(1) *Palliative*, that is the *truss*. Common truss, single or double, inguinal or femoral ; Salmon and Ody's ; mocmain ; various pads, Wood's horse-shoe pad, circular, pyriform and oval pads, water-pads, air-pads. Bag-trusses for irreducible hernia. Spring of common truss encircles pelvis just below crest and anterior superior spines of ilium. Salmon and Ody's has a ball-and-socket joint, with a spring going half round body on side opposite to rupture. Mocmain has a soft belt with a lever spring near the pad. Wood directs pad to be flat, saying that rounded pads tend to dilate hernial apertures. For umbilical hernia, pads with belts, corks, strapping, &c. *See UMBILICAL HERNIA*.

Points to be noted in fitting a truss :—1, side of hernia (right or left) ; 2, size of projection ; 3, size of hernial aperture ; 4, kind of hernia (inguinal or femoral). Measurements : 1, girth of body midway between great trochanter and anterior superior spine of ilium ; 2, distance between anterior superior spine and hernial aperture ; 3, direction in which pressure

should be made. In fat large-bellied people this is usually upwards and backwards, in thin people it may be simply backwards. The pressure of the spring should be adjusted carefully. Infants should have two trusses, that one may be worn while the other is being cleaned. Mocmain truss probably most comfortable, but has very little strength. Persons who have to make great efforts occasionally should have an extra strong truss for such times.

(2) *Radical cure of Hernia, operative treatment.*—In this country Wood, Lister, Mitchell Banks, Rushton Parker, Spanton, Macewen, and others, have done much to bring this subject into greater favour; while, on the Continent, Czerny, Langenbeck, Volkmann, Schede, Lucas-Championnière, &c., in America, Marcy, Warren, Heaton, and De Garmo, and in India, MacLeod have been working successfully. Records of their labours are to be found in the recent volumes of the journals.

There is now strong evidence to show that the existence of the sac is the chief cause of the obstinacy of hernial protrusions. Hence the favourite operations for radical cure now involve *ligature of the neck of the sac*. With antiseptic precautions expose and dissect free the neck of the sac. Return completely all the contents. Open the sac and, if necessary, free contained parts from adhesions. Omentum may be tied, cut off, and the stump passed into the abdominal cavity, or included in the ligature which ties the neck of the sac. Two¹ strong ligatures of tough, well-seasoned carbolic or chromic gut should be placed close together, as high up towards the internal abdominal ring as possible. The sac should be cut off and the ligatured aperture in the peritoneum allowed to slip into the abdomen. The whole or part of the sac may now be excised. The external inguinal ring may itself be sutured (preferably with chromic gut), but this does not seem to be essential. Provide for drainage of the wound, which is now quite extra-abdominal. Suture the skin incision. Dress with an iodoform pad, plenty of packing, and both gauze and rubber bandages.

When the constituents of the cord are spread out, and bear

¹ For safety's sake.

such a relation to the neck of the sac of an old congenital hernia as to make separation very difficult or even impossible, especially if also the patient be rather old and the testicle ill-developed, Volkmann removes the testicle. So also when the testicle has never descended out of the inguinal canal.

Macewen has had great success with an operation in which, after freeing the sac from its attachments to the inguinal canal and inner aspect of the internal abdominal ring, he threads through it a strong catgut which being passed through the muscular aponeurosis from within outwards (after being carried up the canal) and pulled tight, puckers up the sac into a pad on the inner aspect of the internal ring. The conjoined tendon is afterwards sutured to the posterior aspect of Poupart's ligament in such a manner as to restore the valvular nature of the canal.¹

With this operation of Macewen's in my mind, I treated two children with large and troublesome umbilical herniæ as follows. After exposing the sac, or rather its immediate coverings, and separating them from the hernial aperture, I twisted the former gently into a spiral, prevented it from untwisting with a catgut suture, carried this suture through the hernial aperture, and out again through the linea alba an inch higher up. Upon pulling the catgut tight the sac was reduced *en masse* as it were, leaving the hernial aperture empty. A hare-lip pin and twisted suture closed this, and served to fix the catgut by means of which the twisted sac had been reduced. Course and result so far perfect. Twisting seemed more convenient than puckering in this region, in which one's objects are merely to obliterate the sac and get it out of the way.

Spanton of Stafford closes the hernial passages by inserting a corkscrew-like instrument which he leaves from 7 to 10 days. See *Trans. Intern. Med. Congress*, 1881, and *Edin. Med. Journ.*, Aug. 1883. His success has been very considerable.

Warren and Heaton inject subcutaneously an astringent solution into and near the canal. (See *A Practical Treatise on Hernia*. Boston : Osgood & Co.²)

¹ Detailed description in *Annals of Surgery*, Aug. 1886.

² For practical details, see also *Dublin Review*, Feb. 1882.

Being satisfied that some of the dangers of operations involving excision of the sac are not altogether avoidable, I have been myself trying the treatment by astringent injections, but not 'subcutaneously.' I believed that the attempt to inject fluids into the inguinal canal 'subcutaneously' would often result in complete failure, and sometimes in events more disastrous.

An incision is made right down to the external abdominal ring. A blunt probe is then thrust through the external spermatic fascia and passed for an inch or more into the inguinal canal. After using this probe as a guide for a cannula which is slipped over it, the probe is withdrawn and a syringe containing the injection fitted into the cannula. After injecting, rub over the injected fluid with your finger to 'spread' it; and afterwards put a couple of strong catgut sutures into the pillars of the external ring, and adjacent parts of the walls of the hernial canal, finally closing the whole wound with 'buried sutures.' Use a drainage-tube. The injection has been 3ss. of a highly concentrated decoction of oak-bark, freshly made. There has generally followed a slight rise of temperature for a few days (100° or 100°.5) with a little pain. I have performed this operation sixteen times and in most of the cases have had hitherto a satisfactory result. I saw my first patient a few days ago. He remained quite well after the lapse of more than two years. He gave up his truss about a month after the operation.

The total surgical experience of radical cure is now great. The danger attending the proceeding is real though small. On this ground the surgeon should hesitate to recommend it indiscriminately; but, as there is a certain amount of danger of strangulation in a hernia left uncured, especially if femoral, and often immense inconvenience and disqualification, it will often be justifiable to state the case fairly to a patient or his parents, and to allow him or them to decide the question.

When strangulation has compelled a herniotomy, and the parts lie exposed, not only is it permissible to attempt a radical cure by tying the neck and partially or wholly excising the

sac, but it is even probable that by thus cutting off the peritoneal cavity from the wound the prognosis is improved.

That the above proceedings are capable of effecting a real radical cure is a matter beyond question.

A mode of obtaining radical cure by electrolysis is described by Dr. J. Craft, of Cleveland. See *Annals of Surgery*, Dec. 1885, and *Med. News* (U.S.) Oct. 24, 1885.

Complications of Hernia, three primary ones, viz. : 1. obstruction ; 2, strangulation ; 3, inflammation. Gangrene and ulceration are secondary to one of these primary complications.

Obstructed Hernia.—In this condition the impediment to the transit of faeces lies within the bowel, not external to it as in strangulation. But the symptoms differ from those of strangulation chiefly in degree. When obstruction is complicated with inflammation, diagnosis from strangulation is very difficult. Umbilical herniae are the favourite seats of obstruction. Pain, flatulence of tumour, increased tension and size of tumour. On manipulation, gurgling may be produced and solid faecal matter felt. Feverishness, nausea, vomiting. *Treatment*.—Poultices, hot fomentations, and aperient enemata. Gentle purgations before vomiting occurs.

When an irreducible hernia is obstructed, it is sometimes called an '*incarcerated hernia*'.

Strangulated Hernia.—The herniated parts are so compressed at or near neck of sac that the circulation of blood through their vessels and of faecal matter through herniated intestine is obstructed. *Predisposing causes*.—Disordered or relaxed state of health. Sudden formation and descent of a congenital hernia. Working without having the prudence to keep up a hernia by a truss. *Symptoms*.—Local : pain, tenderness, swelling, no impulse on coughing, usually increased tension, uneasy feeling in hypogastrium, dragging sensations from neighbourhood of rupture. General : nausea, anorexia, vomiting, constipation, tenesmus ; feverishness, flushed cheeks, frequent pulse, furred tongue. Then vomiting gets worse, local tenderness increases, peritonitis comes on, patient collapses and dies. The vomiting is rarely absent. It is of a characteristic

nature. Large quantities of fluid are thrown out of the mouth with a sudden gush. This fluid comes at first from stomach, afterwards from intestines ; it is then called 'faecal,' sometimes 'stercoraceous.' Constipation is complete. *Pathology*.—Constriction of hernial tumour at point of strangulation, so that when the bowel is liberated a distinct groove may still remain, marking the line of stricture. Changes which take place in strangulated bowel or omentum are, 1, congestion and swelling ; 2, inflammation ; 3, gangrene. The signs of these three stages will be given in describing the operation of herniotomy, as it is most important to bear them in mind during that operation. The fluid in the sac will be described at the same time. *Diagnosis*.—Generally easy. But if the general symptoms of intestinal obstruction co-exist with any tumour in one of the recognised seats of hernia, unless that tumour is known positively not to be a hernia, and unless the case is yielding to other treatment, the surgeon should cut down upon the tumour. No harm can result from the procedure, properly done. Strangulation is sometimes difficult to distinguish from mere obstruction with inflammation. In the latter case there is less vomiting, always great local tenderness, and, instead of absolute constipation, the occasional passage of flatus and liquid. It is to be borne in mind that peritonitis may complicate without being caused by a hernia. *Treatment*.—1, Taxis ; 2, warm bath ; 3, cold locally (ice-bags) ; 4, opium ; 5, rest in warm bed ; 6, anaesthesia ; 7, herniotomy. Although numbers 2, 4, and 5 are usually described as auxiliary to the taxis, I put them separately for two reasons, viz. : that they are in a few cases perfectly competent to reduce the hernia without the assistance of the taxis ; 2, that they are much underrated nowadays in consequence of the reaction against that sad mistake which has allowed so many cases to pass beyond hope before operation, and in consequence of the notion that these minor remedies act only by relaxing the constricting bands ; whereas they may act directly on the strangulated parts themselves by reducing the congestion and consequently the size of the strangulated intestine. Some amount of circulation must usually exist during the first stages of strangulation, or the intestine would not live

as long as it does. In most early cases, first, make a short and gentle application of the *taxis*. Secondly, give 20 minims of laudanum, then a warm bath for a time proportional to patient's strength, and then place him in bed between blankets.

Still keeping the patient warm in blankets, anæsthetise him, and try the *taxis* gently again. If it fail this time, operate at once. The *taxis*. Position of patient, supine with his legs drawn up. Bear in mind resisting forces, viz. :—1, tightness of constricting ring or band ; 2, swelling of strangulated viscus. Manipulate hernia as nearly as possible into a line with the axis of the ring which constricts it. Then compress it gently but steadily and completely with the hands or with the fingers for a long time. This may lessen its bulk. By-and-by, still keeping up this compression with one hand, attempt with the fingers and thumb of the other to manipulate the neck of the hernial tumour back into the abdomen. When the reduction takes place, the bowel goes back suddenly with a gurgle. Anæsthesia not only makes patient insensible to pain of proceedings, but destroys any muscular resistance that he might otherwise make. Practice of inverting patient during performance of *taxis*. Aspiration of hernial tumour before *taxis*.

Herniotomy.—Usually classed as—1, herniotomy without opening sac ; 2, herniotomy with opening sac. Both operations identical up to a certain point. Scalpel, forceps, director, artery forceps, ligatures, retractors, hernia director, hernia knife ; strong catgut ligatures to tie omentum, neck of sac, &c. Empty bladder. Shave, using soap lather not oil, as the latter obstructs the antiseptic lotion which you rub in immediately afterwards. Line of incision 2 to 3 inches long over neck of sac.¹ Observe the position of certain anatomical landmarks, e.g. spine of pubes, Poupart's ligament. Skin may be divided by pinching up and transfixing. Divide fascia, fat, and cellular tissue on director, layer by layer down to sac. Before opening sac feel for any constricting bands external to sac and divide

¹ As a rule, I prefer to incise the skin farther away from the pubes and fold of the groin. A retractor will pull this opening over the neck of the hernia. This plan places the wound (1) away from regions necessarily septic, (2) away from the centre of the truss-pad, which is generally applied as early as the patient can bear it.

them if possible. If strangulation cannot be relieved thus, proceed to open sac by pinching up a small part of it with forceps and cutting it with knife held flatwise. Complete opening of sac on a director. *How to distinguish sac from intestine.*—The sac is a transparent membrane without the special marks possessed by intestine, such as arborescent arrangement of vessels, smooth, glistening surface, &c. It is also thinner than intestine. The opening of the sac is almost always recognised by the sudden escape of fluid. *Division of stricture.*—Use left index finger as a director, insinuate finger-nail under stricture, pass hernia knife flat, along palmar surface of finger, through stricture, then turn its edge upwards and slightly inwards, and cut $\frac{1}{8}$ to $\frac{1}{4}$ of an inch, *i.e.* a mere notch, no more. *Reduction* of the hernia is then effected by manipulation like that of the taxis. If necessary the knife must be reintroduced and the constricting band notched again. But there are certain conditions under which it is not right to reduce the hernia after dividing the stricture. It follows, of course, that when indications of these conditions are present, no attempt should be made to reduce a hernia without opening the sac to see the actual state of things.

Laparotomy for strangulated hernia.—Under certain circumstances it is better to make a small incision through the linea alba, just above the pubes, through which to pass two fingers and *pull* back the hernia. It is obviously easier to pull than to push a flexible loop through a tightly constricting ring. Such a median incision should be made and treated according to the rules for abdominal section (see pp. 4, 5). Probably many cases of strangulation in an early stage could be very conveniently reduced by this plan without opening the sac.¹ Compare also with the paragraph on umbilical hernia.

Gangrenous bowel, bowel manifestly ulcerated at the seat of stricture, and *omentum inflamed* or bruised should not be returned into the abdomen. In the former two cases an artificial anus will form. In the case of inflamed omentum its return would probably set up general peritonitis; therefore the practice is to tie a stout ligature round its neck and cut the omentum off, merely leaving the neck or stump of it to block

up the hernial ring. Gangrenous bowel has been excised, the edges of healthy bowel sutured together, and the whole returned; but the results, so far, have not been very satisfactory. *Characters of the serum in the sac.*—1. Within a few hours, it is pale yellow and clear. 2. After many hours it becomes dark brown, but clear. 3. When intestine is more inflamed, oedematous, and leathery, the fluid is turbid and coffee-like. 4. As gangrene approaches, blood-clots, lymph-flakes, and pus mix with the fluid. 5. When intestine gives way, faeces and gas escape. *Characters of the intestine at different stages of strangulation.*—First stage: Congestion, various degrees from mere swelling and redness up to purple colour with patches of extravasation causing a mottled look. Second stage: Inflammation, same appearances as those of first stage; but surface is dull and perhaps adherent, being covered wholly or partially with lymph. Third stage: Gangrene; more adhesive; surface duller; colour black or ashy; sloughing and perforation about to occur.

Strangulated Umbilical Hernia, fortunately not common, offers a particularly bad prognosis. Chavasse advocates Crompton and Annandale's plan, of opening the abdomen directly, not the sac, and treating the stricture as it were from behind.¹ When the hernia is reducible, the sac should be excised, its neck sutured, and the hernial aperture closed also.

As soon in a herniotomy as the strangulation has been relieved, the surgeon should consider the propriety of attempting radical cure. In most cases his patient's prospects of recovery from the herniotomy will be improved by ligature of the neck of the sac high up and its division just below the ligature. The scene of operation is thereby made wholly extraperitoneal.

Artificial anus results when herniated bowel sloughs or is deliberately and freely opened by surgeon. Possibility of former event happening even a week after reduction of hernia. Then adhesions prevent intra-peritoneal extravasation. *Pathology.*—Two openings, one into intestine above, other into intestine below. Former tends to enlarge, latter to diminish.

¹ This subject is fully treated in an article in *Annals of Surgery*, June 1886.

Tendency to prolapsus of mucous membrane. Irritation and excoriation of skin. Spur between upper and lower portions of bowel. Many cases recover spontaneously. When opening is high up in small intestine, general nutrition suffers considerably by escape of chyle. *Treatment*.—Zinc ointment round aperture ; bag to catch faeces, or plug to retain them temporarily ; cleanliness. When the condition persists, operate. Divide spur gradually with Dupuytren's enterotome ; division should occupy several days. Then close artificial anus with hare-lip pins, after paring edges. *Faecal Fistula* is a very mild degree of artificial anus, which usually closes spontaneously. Otherwise treat it on general principles.

Reduction en masse.—In the course of taxis, hernia disappears, but symptoms of strangulation come on or remain. Bowel has slipped, not back into peritoneal cavity, but sideways between peritoneum and muscles of abdominal wall. Two varieties : in one, bowel bursts through a hole in neck of sac ; in other, sac as well as bowel is misplaced. *Signs*.—If surgeon himself causes the misfortune, he notes the absence of that sudden jerk with which a hernia properly reduced usually disappears. The history of the case points to the occurrence. Symptoms of strangulation remain unrelieved. *Treatment*.—Operate ; open sac ; pull bowel out of its malposition ; divide stricture and reduce. An *intraparietal sac*, a diverticulum from the ordinary sac, sometimes exists. A hernia may be pushed into it instead of into abdomen.

After-treatment of Herniotomy.—Chiefly negative. Rest in bed ; liquid food till the bowels have acted ; opium (?) ; no purgatives ; enema if bowels do not act spontaneously within ten days. If peritonitis should arise, the surgeon should thoughtfully consider what may be its immediate cause, and it must be treated promptly and vigorously.

Littre's strangulated Hernia.—When only part of the circumference of bowel is involved. Almost always femoral, and in women. Mostly involves lower part of ileum. There is little or no obstruction or excessive or sterco-rectous vomiting. Nor is the abdomen enlarged or distended. There are, however, the local tumour, tender and without impulse,

abdominal pain, slight vomiting, and sometimes diarrhoea. (See, e.g., Dent's case, *Clin. Soc. Trans.*, vol. xv. p. 16.)

IRREDUCIBLE HERNIA.—*Causes.*—1, adhesion ; 2, neglect of reduction combined with hypertrophy of the herniated parts. Adhesions of the parts uncovered by peritoneum make all herniae of the bladder and cæcum irreducible. Omentum is apt to become irreducible. *Treatment.*—Gradual compression by a bag made to lace up, as advised by Langton. Combine this with pot. iod. internally.

SPECIAL HERNIAE.—Birkett's classification :—

I. *In the Epigastrium.*—1. Diaphragmatic. 2. Epigastric.

II. *In the Mesogastrium.*—1. Ventral (also in other regions).

2. Umbilical. 3. Lumbar.

III. *In the Hypogastrium.*—1. Inguino-scrotal (labial in female). 2. Femoral. 3. Obturator. 4. Perineal. 5. Pudendal. 6. Vaginal. 7. Ischiatic.

Diaphragmatic Hernia.—Three kinds, viz. : 1, congenital, left leaflet of centrum tendineum usually absent : 2, ordinary, abdominal viscera pass through one of the naturally deficient parts of the diaphragm, usually close to ensiform cartilage ; 3, traumatic, through a wound. Birkett adds to these, cases of relaxed diaphragm, bulging upwards from pressure of viscera below. *Signs.*—Malposition of viscera may be detected by auscultation and percussion. Occasionally symptoms of obstruction, strangulation, or impeded respiration. Perhaps history of accident.¹ In traumatic and congenital cases there is no sac. *Prognosis.*—Traumatic cases usually fatal. Others may never even be suspected during life. *Treatment.*—Nil.

Epigastric and Ventral Herniae are to be recognised and treated on general principles.

Umbilical Hernia.—Appears commonly either in infants or fat middle-aged women. Umbilical hernia in infants, though termed 'congenital,' differs from congenital inguinal hernia, in having to form its own sac by pushing peritoneum before it. *Coverings.*—Skin, fat, and fascia usually matted together. Neck of sac thickened and strong. *Contents.*—Various. Small

¹ In one case the affected side of thorax was disproportionately large.—Garlik, *Path. Trans.*, 1879.

intestine, stomach, omentum. Often very large. *Prognosis*.—In infants tendency is towards spontaneous cure. Obstruction a more common accident than strangulation. *Treatment*.—Cork and strapping ; pad and bandage ; proper trusses or abdominal belts for severe cases. Better, as a rule, to apply no apparatus to male infants. In operating for strangulation divide the coverings very carefully. See p. 219 and also treatment of hernia in general, above.

Inguinal Hernia.—Classification : I. Direct or internal. II. Oblique or external, including (1) common or scrotal, (2) congenital, (3) funicular, (4) infantile. *Direct* comes out internal to deep epigastric artery, *i.e.* in triangle of Hesselbach. *Oblique* descends externally to deep epigastric artery, *i.e.* comes down inguinal canal. *Common Scrotal Hernia* has a sac altogether independent of tunica vaginalis, and usually lying anterior to it. *Congenital* has for its sac the unclosed tunica vaginalis testis. *Funicular*.—‘Hernia into the funicular process of the peritoneum,’ occupies the funicular portion of the tunica vaginalis, which peritoneal process has, in this case, closed only at or near the external abdominal ring. *Infantile or Encysted Hernia*.—This occurs when the tunica vaginalis is unobliterated from the testicle up to the external abdominal ring. The sac lies enveloped in the tunica vaginalis. ‘*Hernia en bissac*’ is a kind of congenital hernia in which the intestine has burst through a constricted part of the tunica vaginalis. The tunica vaginalis may have been completely divided by a septum at the seat of constriction before the hernia forced its way downwards. *Bubonocele* is an inguinal hernia which lies wholly in the inguinal canal. *Diagnosis of congenital from the ordinary scrotal hernia*.—Congenital hernia occurs in children and youths, appears suddenly, descends rapidly, and envelops testicle. Ordinary hernia occurs in adult age, descends slowly, and is separated from testicle. Infantile hernia, &c., are recognised after death or during operation. In operating you divide in common scrotal hernia, congenital hernia, funicular hernia, hernia *en bissac*, one serous layer ; in infantile or encysted hernia, three serous layers. In congenital hernia testicle is found in sac. *Diagnosis of hernia from other inguinal and*

scrotal swellings. A. Inguinal swellings.—1. Encysted hydrocele of cord, though often reducible, is otherwise altogether unlike a hernia, being transparent, oval, very defined, and tense. 2. Undescended testis. Testis is, of course, absent from scrotum. It gives the characteristic pain on pressure, and is irreducible. Inflamed testis in this situation causes symptoms like those of strangulated hernia. But the vomiting is persistent and continuous, not gushing. Diffused hydrocele of the cord, haematocele of the cord, tumours of the cord, like elephantiasis scroti, are rarely confounded with hernia. B. Scrotal swellings.—1. Ordinary hydrocele. Begins at bottom of scrotum, has usually no neck extending up into inguinal canal, is tense or fluctuating, transparent, without impulse, and generally of characteristic pyriform or oval shape. But hernia and hydrocele may co-exist. 2. Haematocele. Cord defined, no impulse. Perhaps ecchymosis. 3. Varicocele. Worm-like feel. Though reducible when patient is recumbent, yet appears again when he stands up, in spite of finger placed over inguinal ring. 4. Tumours of testis. Cord may be thickened, but is usually normal. Testis itself involved. Tumour heavy, opaque, perhaps hard and irregular. Of course no impulse. Often pain. *Treatment.*—See that of hernia in general. Pad of truss should cover whole of inguinal canal in oblique inguinal hernia, and should never compress cord against pubes. In operating for strangulation, constriction is mostly found at neck of sac.

Femoral Hernia.—Hernia into the crural sheath. Almost always comes through femoral, *i.e.* crural, ring. In a few rare cases has been seen external to femoral vessels. Occurs much more in women than in men. But it must not be thought that inguinal hernia is uncommon in women. In childhood and youth, hernia in females is almost always inguinal; after forty years of age it is usually femoral. For *coverings, relations, &c.* *vide* books on anatomy. *Signs.*—General characteristics of hernia. Situation of tumour: It appears below Poupart's ligament just external to spine of pubes, and though at first descending, eventually turns upwards and outwards in a direction parallel to Poupart's ligament. Femoral hernia is not usually large. *Diagnosis.*—Sometimes difficult. From, 1, en-

larged glands ; 2, psoas abscess ; 3, varix of saphena. Enlarged glands have no impulse, are often multiple, may have an obvious cause, *e.g.* an inflamed bunion. Also they can usually be felt to have no base like the neck of a hernial tumour. In psoas abscess fluctuation can often be produced from one side of Poupart's ligament to the other, that is, from the thigh to the abdomen and *vice versa*. It cannot be reduced with a gurgle like a hernia. Nor is it so near the pubic spine. Manifest spinal disease may co-exist. Varix probably extends some distance down saphena ; and, though reducible in the horizontal posture, it rapidly returns in the erect, in spite of the finger placed over the crural ring. Moreover, the purring impulse given to it by a cough may be felt extending down the vein at a distinct distance from the ring, even in the supine position. But, remember, varix and hernia may exist together. Femoral and inguinal herniæ are distinguished from each other by their relations to Poupart's ligament and the pubic spine, and by the state in which the inguinal and crural rings are found. Although a femoral hernia may ascend, yet its neck is always below Poupart's ligament. *Prognosis.*—Femoral hernia, very liable to acute and fatal strangulation. *Treatment.*—Truss. If a femoral hernia is omental and irreducible, the truss should have a carefully fitted hollow pad. In some cases the rupture will spontaneously go back after a time. Then the patient should be instructed to keep in the horizontal position until the hollow pad has been filled up and reapplied. The question of operation for radical cure will not unfrequently arise in these, which form a very dangerous class of cases. In case of strangulation, flex and adduct thigh during taxis. In operating, cut upwards. Notch slightly because of danger of wounding abnormal obturator artery. Seat of stricture may be falciform process of Burns, Gimbernat's ligament, deep crural arch, or neck of sac itself. Use of term 'Hey's ligament' ought to be abolished, as unnecessary and confusing.

Obturator Hernia.—Very rare. *Signs* obscure. Fulness below Poupart's ligament, beneath rather than internal to femoral vessels. Pain down inner side of thigh. Femoral

ring found normal. Age of patient usually advanced. 'Symptoms of obturator hernia may be those of chronic obstruction associated with emaciation.' Goodhart (*Path. Trans.* 1876). Do not confound with affections of hip-joint. Operation for strangulation would be conducted on general principles, with due care of blood-vessels. It would resemble that for femoral hernia, but fascia lata and pectineus would require incision.

Hernia Cerebri, Testis, &c. See HEAD, TESTICLE, &c.

Herpes.—A dermatitis resembling eczema, but differing from it because the vesicular eruption is more marked and the actual cutaneous inflammation less marked than in eczema, and also because it runs a cyclical course. *Classified* according to locality into herpes labialis, herpes preputialis, &c., and according to form into common herpes, herpes circinatus, herpes iris, herpes zoster; herpes iris is really an erythema, and herpes circinatus is tinea circinata or ringworm. *Causes.*—Nervous origin of herpes zoster, connection of herpes facialis with influenza and pneumonia, and of herpes preputialis with temporary local irritation. (Eczema arises mostly from chronic irritation.) *Signs.*—See definition. Vesicles appear in successive crops, their contents grow turbid, then scabs form. These scabs fall off within a fortnight. Burning pain. Febrile disturbance. Eruption may correspond to distribution of some nerve. Herpes iris and circinatus have smaller vesicles, spread concentrically, desquamate instead of scabbing, and are usually of parasitic origin. *Treatment.*—Soothing and protective. Cotton-wool for herpes zoster. Zinc ointment for herpes preputialis. For herpes circinatus (ringworm), blistering fluid, which should be applied quickly and then washed off at once with water. Ung. hydrarg. ammon., or tinct. iodi, or lin. crotonis. See Alder Smith, on 'Ringworm.'

Hip-disease.—*Morbus coxae.* Disease of hip-joint. *Causes.*—Predisposing are the ages of childhood and early youth. Occasional exciting causes are local injuries, and exposure to cold. Cause often uncertain. Affections of the generative organs have been asserted to sometimes cause hip-disease in a reflex manner. With regard to infection as a cause of hip-

disease, see *Scrofula*. *Varieties*.—Hip-disease has been divided anatomically according as it affects the femur only or the acetabulum. In many cases both are involved. Also it may be acute, sub-acute, or chronic. Or it may be strumous or purely traumatic or rheumatic in origin. Practically speaking, all cases are strumous. Some diseases of the hip-joint—e.g. chronic rheumatic arthritis—never have the term 'hip-disease' applied to them. *Symptoms*.—Three stages: 1st, inflammatory; 2nd, stage of abscess; 3rd, stage of real shortening. *Inflammatory stage*. Before the symptoms are well marked, the term 'incipient' is used. Stiffness of joint. When patient lies on his back his knee is bent upwards. If an attempt be made to straighten it, the small of his back becomes hollow, because the pelvis moves with the femur. Power of abduction is specially limited or even abolished. Wasting of limb, a very early symptom: flattening of buttock and obliteration of gluteal fold. Pain often referred to knee. Apparent lengthening, sometimes apparent shortening, both due to rocking of pelvis. Very rarely real lengthening (?). The patient limps. *2nd stage*. Stage of abscess. Pus burrows, fluctuation occurs sometimes in one place, sometimes in another. Probe very likely fails to find dead bone. *3rd stage*. Stage of real shortening. This results from the gradual destruction of head and neck of femur. Top of trochanter ascends above Nélaton's line, a line drawn from ant. sup. spine of ilium to tuberosity of ischium. Abscesses or sinuses, lordosis, flexion of thigh on abdomen, wasting of buttock and thigh, and pain continue as in former stages. The disease naturally terminates either in death from exhaustion or amyloid disease, or in recovery with ankylosis. The ankylosis usually tends to be in the flexed and adducted position with a compensatory spinal curve of the kind called lordosis. This curve has little or no tendency to become permanent, and disappears in the sitting position. *Pathology*.—Disease may begin either (1) in the bone near the joint, or (2) in the soft tissues, synovial membranes, or ligaments of the joint. In the latter case the disease is sometimes named 'arthritic.' It is a generally accepted doctrine now that the only joint disease which begins in the cartilage is

chronic rheumatic arthritis. For a description of the general changes which take place in hip-disease, *see DISEASES OF BONES and OF JOINTS*. Ligamentum teres soon gives way. Head of femur perishes by caries or by necrosis. If acetabulum is affected, it is apt to perish partially by necrosis, often becoming perforated. Even when head of femur is destroyed, remains of neck of femur rarely leave acetabulum. True dislocation on dorsum ilii does occasionally occur, or, acetabulum being perforated, head of femur may slip through into pelvis. The natural tendency is towards a cure by ankylosis. In acetabular disease, sinuses usually form in buttock, or close to pubes. In femoral disease they usually open lower down thigh, especially below and in front of great trochanter. *Diagnosis*.—Most cases of hip-disease are unmistakable. Sometimes difficult to distinguish incipient hip-disease from other affections which cause pain about the hip, accompanied by lameness, common rheumatism for example. No disease of the parts about the hip causes such stiffness of the joint : that is a great point. Pain in the knee may lead off the attention to the wrong place. Many affections—*e.g.* curvature of spine, and hysteria—cause rocking of pelvis and apparent shortening or lengthening. In healthy people, the lower extremities are often slightly unsymmetrical.¹ But in such persons if one leg is much shorter than the other, the feet will probably also be disproportioned. Comparative measurements should be taken from ant. sup. spines of ilia to upper or lower end of patella or to inner malleoli. Enlarged bursa under psoas is very rare ; and the pain, if present, is relieved, not aggravated, by flexing thigh on abdomen. Hip-joint disease could hardly be accompanied by such marked swelling over the joint without presenting characteristic and marked symptoms. Hysteria must be diagnosed on general principles. *See HYSTERICAL DISEASES OF JOINTS*. It is scarcely necessary to give the diagnosis of hip-disease from psoas abscess, sacro-iliac disease, and congenital dislocation. *Prognosis* depends on stage of disease, original constitution of patient, present condition of patient, on parts

¹ See Garson, *Journ. Anat. and Phys.*, 1880.

actually diseased, and on age of patient. In first stage of disease, especially if symptoms point to origin in joint itself, treatment may be expected to result in recovery with or without ankylosis in good position. A certain proportion of cases become tuberculous elsewhere. Prognosis is worst in adults with acetabular disease. The only cases in which recovery without ankylosis is to be reasonably looked for, are those in which the cartilage has never been affected. *Treatment*.—1. Rest, including (a) Fixation, (b) Extension. 2. Counter-irritation. 3. Injection. 4. Erosion. 5. Excision. 6. Amputation. 1 (a). Fixation:—Thomas's splint; plaster of Paris; Thomas's splint and Jordan's method of using plaster of Paris. (See E. S. Bishop, *Brit. Med. Journ.*, July 7, 1883.) In applying plaster of Paris, the patient can be conveniently suspended as if for the application of a Sayre's jacket. Fixed appliances should extend from the chest near the axillæ nearly down to the ankles. Double splints—De Morgan's, Bryant's modification of ditto. Chief value of these lies in their power of correcting tendency to undue adduction or abduction. 1 (b). Extension; may be used with last-named splint. Weight and pulley (3 to 10 lbs.) according to age and individual peculiarity. Long splint on sound side; weight to diseased limb. Limb should be straightened under anæsthetic, if weight fails to bring it down easily. Then prevent inflammatory reaction by applying ice-bag. For erosion or excision, the joint is best approached from behind. See *Excision of Hip*. But it can be injected from the front, keeping well outside the femoral artery. Cod-liver oil and iron. Fresh air. Sea air. Other general treatment for struma.¹

Hodgkin's Disease. See *TUMOURS* (sect. *Lymphoma*).

Horns. *Vide WARTS.*

Housemaid's Knee. See *BURSÆ, ENLARGED*.

Hydatids occur in bones, breast, muscles, the viscera, and other parts, and, in surgery, are rarely diagnosed from other cysts till operation has let out hooklets, &c.

¹ See also notices of *Bone, Strumous Disease of*; *Excision of Hip*, and *Joint-Disease (Chronic)*. An excellent work on Hip-Disease has just been written by G. A. Wright, of Manchester.

Hydrocele.—An accumulation of serum forming a swelling in connection with the testicle or spermatic cord. *Varieties.*—1. Hydrocele of the tunica vaginalis testis (common hydrocele). 2. Hydrocele of the cord (sometimes called 'encysted hydrocele of the cord'). 3. Encysted hydrocele (frequently called 'encysted hydrocele of the epididymis,' or 'of the testicle'). 4. Diffused hydrocele of the cord. 5. Congenital hydrocele. 6. Infantile hydrocele.

Hydrocele of the Tunica Vaginalis Testis.—*Causes.*—Middle age, weak constitution, and gout predispose. Injury and orchitis excite. In most cases there has been no known exciting cause. *Signs.*—A scrotal tumour, smooth, oval, pyriform, or globular (often constricted in the middle); elastic, tense or fluctuating, transparent or semi-transparent (rarely quite opaque). No connection with abdomen. Cord free near abdominal ring. No impulse on coughing. Penis gets 'absorbed,' as it were, into tumour. *Diagnosis.*—*Vide Hæmatocele and INGUINAL HERNIA.* *Treatment.*—1, palliative; 2, radical cure. Palliative=tapping with trocar and cannula, or mere use of discutient lotions+suspensory bandage. In tapping, make out position of testicle by palpation, by assistance of patient's sensations, and by use of candle and stethoscope. Grasp tumour firmly in left hand, so that testicle lies in centre of left palm. Plunge trocar obliquely upwards and backwards into junction of middle and lower thirds of hydrocele. The fluid usually collects again. Lotio ammoniæ hydrochlor. (3j. to 3vj.) used as a discutient for infantile and congenital hydroceles. Radical cure.—First empty the hydrocele, then inject two drachms of port wine or of tinct. iodi or of liq. iodi. Platinum cannula should be used for iodine. Lewis recommends carbolic acid and glycerine, &c & 3ss., instead of iodine, and says it is less painful. Ogier injects tinct. iodi (3ss.) several times, at intervals of a few days, without withdrawing the fluid. Treatment by seton not to be recommended. An effective and safe plan is, with strict Listerian precautions, to make an incision, about an inch and a half long, through both skin and tunica vaginalis, and sew the two together with four or five silver sutures. Remove the sutures on the sixth day. *Pathology.*—A

serous dropsy of the tunica vaginalis, probably of chronic inflammatory origin. The radical cure acts by checking the secretion of the tunica vaginalis, and rarely results in the production of adhesions.

Hydrocele of the Cord.—Its pathology is probably that of a dropsy of a small unobiterated part of the tunica vaginalis funiculi. It may sometimes be an independent cyst. Its appearances are quite characteristic. It is transparent, feels like a pigeon's egg, only more elastic, and slips up and down between the fingers with great mobility. You may fancy that you have reduced it into the inguinal canal, when suddenly, in a humorous way, it may be discovered half-way down the cord towards the testicle. Occurs in the young. *Diagnosis.*—Only in rare cases, when it extends right into the inguinal canal and patient is so fat as to hide transparency, can this affection be mistaken for a hernia. *Treatment.*—Tap and inject with tinct. iodi and water, equal parts. Before injecting be sure that the case is not one of 'congenital' hydrocele.

Encysted Hydrocele.—*Signs.*—Those of cyst attached to the testicle, usually to the head of the epididymis. *Pathology.*—A cyst containing sometimes pure serum, but frequently a mixture of serum and seminal fluid. An opening has often been found between the seminal tubules and the cyst. The cyst may originate from a dilated seminal tubule, or from a dilated cavity in the connective tissue, or, according to Osborne, from enlargement of the 'hydatid of Morgagni.' *Treatment.*—Same as that of ordinary hydrocele.

Diffused Hydrocele of Cord.—Unknown to living surgeons. Described by Pott. But hydrocele of cord sometimes receives this name if it forms a long, rather ill-defined tumour.

Congenital Hydrocele.—Tunica vaginalis funiculi is open as in hernia into tunica vaginalis testis, but the open process contains peritoneal fluid instead of intestines. *Treatment.*—Puncture with fine trocar, and then try to close the opening by the pressure of a truss.

Infantile Hydrocele.—Occurs in infants in whom tunica vaginalis has only closed at external abdominal ring. *Treatment.*—Discutient lotions. Puncture. If it is certain that

there is no communication with peritoneal cavity, iodine injection may be employed in obstinate cases. Many cases disappear with very little treatment.

Hydrocele occasionally occurs in the female. A complete monograph in *Amer. Journ. of Obstetrics*, 1881.

Hydrops Articuli. See JOINTS, DISEASES OF.

Hydrophobia.—A disease which is communicable by inoculation with the saliva of dog, cat, or (?) any other animal which may suffer from it.

Symptoms in Dog.—Two forms (or two stages ?), viz. : 1, a raving madness ; 2, a quiet madness. Certainly these stages do sometimes follow each other in the same dog. Or three stages may be distinguished : 1, of dulness with restlessness ; 2, of fury ; 3, of paralysis. In the first stage the animal wanders about in a fidgety, uncomfortable manner, is evidently ill, and looks suspicious, unhappy, and distrustful. In the second stage, much of the fury is evidently due to hallucinations. He bites, but it is often at imaginary enemies, and he may still be mindful of his master's voice. In the third stage, paralysis makes the voice muffled or inaudible, the jaw drops, and the legs totter and fail. Finally death comes from exhaustion. The mad dog rarely shuns water, but laps it without swallowing.

Hydrophobia in Man.—Proportion of bitten cases attacked, estimated by Trousseau at one in two, by Billroth at one in twenty ! Period of incubation : six weeks to more than a year. Rarely less than six weeks. *Symptoms.*—First, great irritability, excitement, and restlessness. Spasms on attempting to swallow occur sometimes, but rarely, in this stage. Irritability and sensitiveness to light, sound, &c., increase and become excessive. Soon the slightest causes produce spasms. Then gradually comes the fear of water, together with unspeakable thirst. Sleeplessness. Terror of the spasms and their causes. Actual madness occurs rarely. Appearance of most fearful anxiety. Hoarseness. Frothing at the mouth. Severe tetanic spasms now, from time to time, suspend respiration ; and, finally, in one of these the patient dies asphyxiated. Note the different ways in which death occurs in the dog and in man, for in the former it comes by exhaustion. *Diagnosis.*—1. From tetanus.

In tetanus there is a certain amount of persistent spasm, in hydrophobia there are intervals of complete relaxation. Tetanus is also a quiet disease, so to speak, and is unaccompanied by horror of water, even although the sufferer may be unable to drink.

2. From hysterical or neuromimetic hydrophobia. In the sham disease there is dysphagia, but no alarming spasm of the respiratory muscles.

Prognosis.—Hopeless.

Pathology.—Congestion of spinal cord has been observed with collection of leucocytes around the capillaries. Analogy would suggest that rabies is due to micro-organisms, and Pasteur believes himself to have discovered the essential virus of it; but Koch asserts, and apparently with reason, that the former has mistaken for it the pathogenic organisms which cause 'septicæmia of rabbits.'

Treatment.—All remedies tried until recently have probably been vain. Suffering may be alleviated by rest, darkness, and perhaps by anaesthetics. Hot-air bath. Chloral. Cannabis Indica. (See *Brit. Med. Journ.* Nov. 18, 1881.) With regard to prophylaxis, cauterisation should be done, early if possible, but better late than never. Surgeons of great ability have named various limits of time at which they say cauterisation ceases to be of any use. These limits differ considerably, and it has yet to be shown on what sufficient grounds they have been fixed. One may ask for *demonstration* that the poison does not remain near the wound during the period of incubation. Cauterisation may be obnoxious; but what consideration is this when compared with the faintest chance of preventing the most horrible of diseases? Vesicles ('lyssi') appear near *frænum linguae* between third and twentieth day after bite. It has been recommended to examine patient twice a day during this period, and lay open and cauterise the lyssi as they appear. Trousseau supports this recommendation. With regard to Pasteur's treatment by systematic inoculation with the hydrophobic virus attenuated by certain methods of culture in living animals, it can scarcely be denied that a now very large experience powerfully supports its claims to efficacy, although cases have occurred in which the treatment itself may have been fatal.

Hypertrophy.—Increase in size of the tissues of a part,

not the ordinary natural result of growth. Sometimes accompanied by increased development of the individual microscopic constituents of the tissue—*e.g.* when the gravid uterus enlarges, the individual muscle-cells also grow. *Causes.*—Exercise, irritation, hyperæmia, general overfeeding, special overfeeding, certain special diseases. Irritation may be direct or indirect. An example of indirect irritation as a cause is hypertrophy of breast from uterine irritation. Irritation certainly acts partially, if not wholly, by producing hyperæmia through reflex inhibition of vaso-motor system. By special overfeeding is meant the excessive deposit of fat which may result from taking fat-forming food to excess. As examples of hypertrophy from special diseases, may be cited the large joints of rickety children and the thickened skin in elephantiasis scroti. *Treatment.*—Remove cause. Favour venous circulation, and, in suitable cases, diminish arterial. Pressure. Treat special diseases. Operative measures. *Vide* various articles in this book on hypertrophy of particular organs and parts.

Hypospadias. *See* PENIS.

Hysterectomy. *See* Appendix on UTERINE SURGERY.

Hysteria.—Hysteria is, according to custom, held to be in the province of the physician, and the surgeon is only called in when this ‘protean malady’ assumes the outward form of surgical disease. Hence the best general articles on hysteria are to be found in medical treatises. From the surgeon’s point of view, Mr. Savory treats the subject graphically in Holmes’s *System*, vol. i. Its *essential nature*. Paget has called it ‘madness of the spinal cord;’ but its phenomena are, perhaps, more easily explained on the supposition that it arises from ‘a nutritive derangement of the general nervous system, both central and peripheral.’—Hasse, as quoted by Niemeyer. *Causes.*—No doubt a congenital predisposition often exists. In most cases there is certainly to be found an exciting cause in the form of chronic irritation of some system or organ of the body, usually the genital organs. Uterine infarctions, ulcerations, and flexions. Ovarian diseases. Abnormal sexual irritation, onanism. If you want to cure your patient, do not let modesty or benevolent belief in human nature blind you. Do not ignore those causes

which undoubtedly second what is frequently the prime cause; but there is much less fear of this error than of the error which consists in being satisfied with the discovery of some psychical explanation of a given case—*e.g.* excessive intellectual exertion, or unhappy married life. The surgeon must judge the causation from objective symptoms. Slight degrees of hysteria are not at all uncommon in men; but almost all marked cases occur in women. Usual age, from 12th year to 20th, and again at the 'change of life.' Sedentary occupation. Town life. Bad training in childhood. *Signs.*—1. Derangements of sensibility. General hyperæsthesia, 'nervousness.' Great acuteness of the senses. Idiosyncrasies. Desires for peculiar foods, objections to common foods, &c. Neuralgias. Painful and tender breasts, migraine, face-ache and other pains. *Clavus hystericus*—that is, pain in one small point in the head. Tenderness of the back. Severe pains and exquisite tenderness in some joint or other. (See JOINTS, NEUROMIMESIS OF.) In contrast with above symptoms are the frequent cases of real or pretended anaesthesia. Difficult to tell whether some cases of hysterical anaesthesia are real or sham. Unnatural consciousness of the actions of healthy organs of the body. Palpitations. Sense of weight in epigastrium during digestion. Great thirst. Frequent micturition. Retention. 2. Hysterical convulsions. These vary in intensity from slight local spasms to severe general spasms with opisthotonus or other convulsive curvature of the spine. In these attacks patient never loses consciousness. Yawning, laughing, crying, *globus hystericus*. Eructions. 3. Curvature of the spine. Affections of joints. 4. Derangements of vaso-motor system. Cold hands and feet. Sudden and prolonged flushing of the face. Hyperæmia of kidney, causing large flow of limpid urine, 'urina spastica.' 5. Mental symptoms. Rapid alternations between grave and gay. General tendency is towards depression. Craving for sympathy. It is this craving, probably, which produces a tendency to exaggeration and malingering. Of course all the above remarkable symptoms cannot be looked for in the same case. *Diagnosis.*—Hysteric imitations of organic disease are always imperfect; because hysteria, if one may be allowed to personify it, is quite ignorant

of pathology and knows little of anatomy. Hence pain rarely confines itself with accuracy to any defined anatomical structure or region. In hysterical joint-affections the skin over the joint is often exquisitely tender, while deep, firm pressure upon the joint itself may cause little or no pain. At the same time the limits of that portion of skin which is tender bear no relation to the distribution of any known nerve or vessel. Subjective symptoms last even for years without producing any corresponding alterations in the structure of the affected part. An hysterical patient describes her sufferings in a characteristic way. It is not difficult to make her smile and talk with cheerfulness and liveliness even when the subject is pain which she describes as 'agonising,' 'unendurable,' 'excruciating.' Hysterical spasms disappear under anaesthetics and often also during sleep. There are, also, concomitant general signs of hysteria. *Prognosis.*—Some cases of hysteria resist all treatment. Many of these have one foot across the narrow line which separates hysteria from insanity. *Treatment.*—Treat the cause, whatever that may be. Moral treatment: encourage and lead the patient to exercise her will. Hysteria often attacks persons who have never in childhood been taught to control themselves. Sea-bathing, cold shower bath, early rising, open-air life, tonics, bromide of potassium. 'Antispasmodics,' valerian, assafœtida. Electricity is often invaluable. Weir Mitchell's treatment by isolation from friends, with massage and systematic feeding, very successful, but expensive.

Impetigo.—Is nearly allied to eczema, and eruptions are common which are intermediate between the two. But impetigo is a pustular, not a vesicular disease, and forms thick crusts and scabs. *Causes.*—Chronic irritation; for instance, 'grocer's itch,' an impetigo of the hands, is caused by constant contact with sugar. Dirt, lice, contagion, syphilis. *Situation.*—Usually, head, hands, or face. Pustules usually correspond to hair-follicles. Syphilitic impetigo occurs in large patches. *Treatment.*—Poultice to bring off scabs. Ung. zinci; ung. hydrarg. ammon.; ung. sulphuris, and mixtures of these ointments. Treat general health, and syphilis if present. Sulphur baths.

Impotence.—Incapacity for sexual intercourse. Note the

difference between this definition and that of sterility. Impotence occurs in women as well as men. *Causes.*—1. Original malformation of copulatory organs; marked epispadias or hypospadias; absence or occlusion of vagina, and double vagina. 2. Accidental deformity of copulatory organs; amputation of whole penis; occlusion or obliteration of vagina by cicatricial contraction. 3. Organic affections of the less superficial genito-urinary organs; spermatorrhœa; varicocele; castration. 4. Nervous influences. The condition called 'irritability with weakness' usually depends on both third and fourth class of causes. When impotence is not the effect of visible malformation, it almost always is the result of masturbation, very rarely of sexual excess. Masturbation usually leads, in the first place, to 'irritability with weakness.' Here ejaculation takes place before entrance is effected, or else erection is impossible, and, consequently copulation impossible. This condition is not always the result of masturbation. Disgust for the female, or the fear of sin or of contagious disorders, doubtless causes it in some cases. *Signs and Prognosis.*—Some are given in the preceding paragraphs. Sometimes the genitals are flabby, cold, and small. If, in such cases, erections *never* occur, not even in bed in the morning, the prognosis is not very good. But so long as erections occur at all, the prognosis is very hopeful. *Treatment.*—Four principles:—1. Strengthen general health; fresh air, sleep, moderation in all things—in exercise, in diet, and in mental work; 2, avoid all unnatural excitement of genital organs; 3, treat any physical defect which can be found: if there is the slightest sign of varicocele or relaxation of scrotum, give patient my suspensory bandage; 4, to complete the cure—at all events, to demonstrate the cure to the patient—requires the moderate and regular practice of sexual intercourse for a short time. Of course it is right that this should be done in the married state. Paget writes: 'Some will expect you to prescribe fornication. I would just as soon prescribe theft or lying, or anything else that God has forbidden. Celibacy does no harm to mind or body; its discipline is excellent: marriage can be safely waited for.' If the patient is already married, attend to the first three indications, give some mysterious and

harmless medicine, and forbid intercourse for three weeks: 'The nonchalance that he thus acquires during sexual excitement, and inattention to the strength and duration of the erections, render cohabitation possible, and he has the first successful coitus during the time it was forbidden.' Lallemand's *porte caustique*. A solution of *argent. nit.* (gr. v. to $\frac{3}{4}$ j.) is applied to prostatic part of urethra every other day. This is a treatment now unjustly neglected. Faradisation of inner surface of thigh, of testicles and lower part of spine. Constant current to spine. 'Positive pole over 5th dorsal vertebra, negative over sacrum or perineum. Three or four sittings a week, one to three minutes each.' Battery, 20 to 30 Daniell's elements of medium size.¹

Incontinence of Urine.—Differs very much in cause and treatment according as it occurs in children, in hysterical young people, or in adults. *Causes.*—1, in children: either wilful laziness or a genuine disease, probably partial anaesthesia of bladder. *Phimosis*: adherent prepuce. More remote causes are worms, calculus, and struma. 2, in hysterical girls: *vide* causes of hysteria. 3, in adults: a distended state of bladder, the result of paralysis. 4, operations on the prostate and neck of the bladder. Those cases in which the urine can only be retained in the bladder for a short time may be classed with **IRRITABILITY OF THE BLADDER**, *quod vide*. *Treatment.*—Of incontinence in children: remove the cause; treat the patient kindly, rather encourage than frighten him; avoid corporal punishment in children; flannel clothing at night; wake the child every three hours to micturate; try cold douche to spine every morning. Extractum belladonnæ gr. $\frac{1}{2}$, or tinct. belladonnæ $\frac{1}{2}$ oz. ter die. Tonics: strychnine, cantharides, chloral at bedtime. Circumcision. For hysterical incontinence, treat the hysteria. Cold sitz baths. For incontinence from paralysis, *see BLADDER, PARALYSIS OF*. Incontinence also arises from enlargement of middle lobe of prostate. *See PROSTATE, HYPERTROPHY OF*.

Inflammation.—*Definition.*—When a structure is attacked with inflammation, there are active hyperæmia of the part itself,

¹ Dreschfeld, *Practitioner*, vol. xiii. p. 360.

accumulation of leucocytes outside its blood-vessels, and a disturbance of its nutrition. In the case of a non-vascular part the hyperæmia is in its immediate neighbourhood, and, perhaps, the increase of corpuscles is due to division of the proper corpuscles of the part. So far there is nothing in the above definition to distinguish inflammation from the process of repair. And there can be no doubt that the word inflammation is constantly used to name action which is identical with the process of repair—*e.g.*, in the case of most slight localised 'inflammations' terminating in what is called 'adhesion.' Inflammation is usually distinguished from 'repair' by saying that it is 'an excess of action.' This definition appears to be scarcely satisfactory. When a surgeon says that a wound is inflamed, in ninety-nine cases out of a hundred, if not in the whole hundred cases, the state of things is probably this:—Processes resembling those necessary to 'repair' have begun around the lymph or blood capillaries near the wound; whereas the action ought to have been confined to the actual base and borders of the wound itself. The term 'inflammation,' as commonly used in surgery, thus does sometimes mean an excess of action; and sometimes means action which it would be absurd to call excessive; as, for instance, in the very localised 'inflammation' which so often prevents extravasation of faeces through a wound of intestine. In the latter case, the phenomena of inflammation can scarcely be shown to differ from 'repair.' In the former they differ in this respect namely, that the processes have spread from the region where they might have been useful to the neighbouring vessels and lymphatics, where they are worse than useless.

Caution.—I do not recommend the student under examination to trouble himself about the immediately foregoing remarks. He will find most safety in merely speaking of inflammation as 'a perverted vital action' or 'modified nutrition,' and then plunging instantly into a description of its observed phenomena, &c.

Causes.—A. Predisposing: 1, plethora, especially if coincident with a weak circulation; 2, local congestion; 3, impurity of the blood, such as arises from kidney or lung disease; 4, alcoholism; 5, chronic inanition (? does this cause inflammation or only modify it in an evil manner); 6, atheromatous arteries;

7, defective innervation ; 8, bodily state left after certain *zymotic* diseases—*e.g.* measles and typhoid ; 9, specific ‘diatheses’—*e.g.* gouty and rheumatic ; 10, congenital peculiarities. The above list could be amplified *ad infinitum* by going into detail—*e.g.* Cause 2 includes all the causes of œdema and dropsy, varicose veins, pressure of tumours on veins, &c. B. Exciting causes : 1, physical ; 2, chemical. Both these may be either of external or internal origin—*e.g.*, a joint may inflame from the physical irritation of a contusion, or of a loose cartilage, or from the chemical irritation of an iodine injection or of gouty products. The common practice, of classing quite separately the morbid products of the body itself, is illogical ; for these products act either physically or chemically ; 3, injuries or diseases of nerves ; 4, specific influences. Physical causes include blows, wounds, strangulation, &c. ; chemical include effects of strong acids and alkalies. An example of inflammation following nerve-injury is that of the eyeball which follows injury of the ophthalmic nerve. Specific influences are such as syphilis, small-pox, and measles. The actions of heat and cold are partly chemical and partly physical.

Phenomena.—Classical signs—pain, heat, redness, swelling. *Pain.*—Results from either tension or compression of nerve-fibrils. Its character and intensity vary with the locality. Osteitis causes aching, phlegmonous erysipelas causes throbbing pain, and superficial inflammations produce burning, tingling pains. With pain is associated tenderness. In the nerves of special sense, special sensations take the place of pain—*e.g.*, tinnitus aurium in catarrh of the tympanum—while the intolerance of light in ophthalmia is analogous to tenderness. Pain is often diffused—*e.g.*, pain throughout one side of face and head in toothache ; or reflected—*e.g.*, pain in knee from hip-disease. *Heat.*—Inflamed parts, except in very chronic cases, feel sensibly hotter than normal. According to Mr. Simon and Dr. Montgomery, the blood leaves the inflamed part hotter than it enters it, and the inflamed part is hotter than either the blood which flows into it or the blood which flows out of it. Continental observations on this question have been numerous and conflicting. The subject of rise of general bodily

temperature is noticed under the head of Fever. *Redness*.—Due to hyperæmia. Bright when there is active fluxion of blood to the capillaries of the part, as is usual in acute inflammations; dull, perhaps blue or brownish-red, when the congestion is more passive, as is usual in chronic inflammations. When a non-vascular part inflames, the redness is observed in the neighbouring vascular region from which the inflamed part derives its nutrition. *Swelling*.—Partly due to congestion, partly to effusion. Effusion resembles in character liquor sanguinis, but it contains excess of chloride of sodium and of phosphates. It also contains leucocytes and even red blood-corpuscles. As a consequence of excess of chloride of sodium in the effusion, there is a deficiency of that salt in the urine. The characters of the effusion differ in different inflammations; especially variable is the amount of fibrin.

Pathology.—Microscopic observation of an inflamed part—e.g., the web of a frog's foot which has been exposed to irritation—shows appearances which may be described under three heads, viz. : 1, disorder of circulation ; 2, exudation ; 3, stasis. After describing these, I shall consider the structural changes which take place in the constituents of the inflamed part. 1. *Disorder of Circulation*.—Dilatation of the arteries is the first phenomenon observed in an inflamed region. It is ordinarily preceded by no antecedent contraction. It increases gradually for ten or twelve hours, and remains at its maximum for many hours. Dilatation of the veins follows at a long interval of time. The rate of circulation at the commencement is increased, but this soon changes to the very reverse, viz., abnormal slowness. The cause of the vascular dilatation is undetermined, but a very reasonable hypothesis attributes it to inhibitory nervous influence. Billroth thus states this view :—‘ We actually know such phenomena from physiology ; the obstruction of the heart's action by irritation of the vagus nerve, of the movements of the intestines from irritation of the splanchnic nerves, &c. Here a vaso-motor nerve-system is supposed which arrests the contraction of the muscles ; could not such a vaso-motor nerve-system also be supposed for the vessels—nerves, irritation of which lessens the tone of the muscles of

the vessels and thus renders the walls less capable of resisting the pressure of blood ?' That local nerves have an unquestionable influence over the circulation in inflamed parts has been experimentally proved.—See Holmes's *System*, vol. v. pp. 735-8. Ammonia when used as an irritant to excite inflammation has this exceptional property—it excites a preliminary arterial contraction before the ordinary vascular dilatation. 2. *Exudation*.—As soon as the rate of circulation begins to slacken, white blood-corpuses or leucocytes begin to accumulate and loiter along the side of the minute veins and the capillaries. 'In this way the vein becomes lined with a continuous pavement of these bodies, which remain almost motionless, notwithstanding that the axial current sweeps by them as continuously as before, though with abated velocity. Now is the moment at which the eye must be fixed on the outer contour of the vessel, from which (to quote Professor Cohnheim's words), here and there, minute colourless button-shaped elevations spring, just as if they were produced by budding out of the wall of the vessel itself. The buds increase gradually and slowly in size, until each assumes the form of a hemispherical projection, of width corresponding to that of a leucocyte. Eventually the hemisphere is converted into a pear-shaped body, the stalk end of which is still attached to the surface of the vein while the round part projects freely. Gradually the little mass of protoplasm removes itself further and further away, and, as it does so, begins to shoot out delicate prongs of transparent protoplasm from its surface, in no wise differing in their aspect from the slender thread by which it is still moored to the vessel. Finally, the thread is severed and the process is complete. The observer has before him an emigrant leucocyte.'—Burdon-Sanderson. But although all the leucocytes observed outside the vessels in the earlier stages of inflammation have probably escaped from the vessels, there is still reason to believe that later accumulations of them are partially due to proliferation of the extra-vascular corpuscles. 3. *Stasis*.—The phenomena of stasis occur at an uncertain time during the course of inflammation, but they are not, as is sometimes stated, the first in order of occurrence.

They are twofold : first, the blood-current stops altogether, after getting gradually slower and then oscillating ; secondly, the coloured corpuscles cohere with one another and adhere to the sides of the vessels till they form an accumulation so dense that the capillaries seem to contain no liquor sanguinis, but only corpuscles. As similar occurrences take place even when milk is substituted for blood, and as the blood drawn in inflammation shows no special arrangement of its corpuscles, it is assumed that the phenomena of stasis are due to a changed condition of the walls of the blood-vessels.

Structural changes which take place in constituents of inflamed tissues.—In non-vascular tissue, such as that of the cornea and of cartilage, the proper cornea and cartilage corpuscles proliferate. But numbers of leucocytes migrate from the vessels around the cornea into its substance. In cartilage the cartilage-cells multiply by division, and then cause the absorption of the stroma in which they lie. In tendon and in muscle similar changes have been observed. In the case of parts lined with epithelium, such as mucous and serous membranes and glands, it is probable that the greater part of the corpuscles of the inflammatory new formation are escaped leucocytes ; but, at least in the case of epithelial membranes, proliferation of epithelium appears to have been observed.

Further changes are described under headings noticed in the following paragraph.

Terminations of Inflammation.—1, resolution ; 2, adhesion or organisation ; 3, suppuration, including abscess ; 4, ulceration ; 5, gangrene, or mortification. These processes are described respectively under the following heads : 1, 2, and 3, WOUNDS, REPAIR OF ; 3, ABSCESS ; 4, ULCERATION ; 5, GANGRENE.

Treatment of Inflammation.—Consider it under heads—A, indications ; B, remedial agents ; C, differences according to whether a case is acute or chronic. A. *Indications.*—1, to remove all sources of irritation, especially tension and sepsis, and all predisposing causes ; 2, to lessen local action ; 3, to guard against or treat promptly all complications, or evil consequences ; 4, to support the patient's strength during pro-

longed and exhausting cases ; 5, to relieve pain. **B. Remedial agents.**—These are either local or general. Local agents : Rest, cold, blood-letting, pressure, ligature or compression of artery supplying inflamed part, incision, drainage, antisepsis, warmth with moisture, astringent and stimulating drugs, counter-irritation, and certain other agents which will be noticed in considering the treatment of chronic inflammation. Constitutional agents are : Rest, blood-letting, dieting, stimulation, drugs, mercury, antimony, aconite, belladonna, purgatives, diuretics, colchicum, iodide of potassium, quinine, opium, other anodynes ; diaphoresis ; 'spinal' ice-bags. Some of the agents in the above list overlap one another—*e.g.*, 'diaphoresis' partly includes 'antimony' ; but it is impossible to devise a satisfactory list without this fault.

Rest.—Bed, splints, slings, cradles; bandages (starch, plaster of Paris, paraffin, glue, gum, silicate of potash). Position : elevation. Flexion or extension. *See* JOINT DISEASES and FRACTURES. **Cold.**—Ice-bags, bags and tubes through which a continuous stream of cold water can be made to pass, irrigation, cold douche, wet packing, evaporating lotions. Excessive cold with wet involves danger of frost-bite. **Local blood-letting.**—Leeches, cupping, dry cupping,¹ incisions, scarifications, punctures, local venesection *i.e.* pricking veins near inflamed part). **Pressure.**—Bandages with subjacent layer of cotton-wool, elastic bandage, pressure regulated by means of india-rubber bags containing water,² shot-bags. **Ligature, compression or acupressure of artery of inflamed part or main artery of limb.** Neudorfer says eight minutes of pressure, three or four times a day, suffice. **Incisions.**—Though mentioned above in connection with local blood-letting, are yet more frequently used to relieve tension.. Extent and depth vary ; usually they are about $1\frac{1}{2}$ in. long. Avoid vessels and nerves of any size. **Cut in axis of limb.** **Antisepsis.**—*See* ANTISEPTIC TREATMENT and WOUNDS.—**Warmth with moisture.** Poultices, fomentations, water-dressing, spongiopiline.—**Astringent and stimulating drugs.**—Extract of belladonna and glycerine, equal

¹ Of course dry cupping is not really blood-letting, but its action is similar.

² See *Lancet*, November 1878.

parts; silver nitrate, tannic acid, and all the various astringent, stimulant, caustic, and sedative drugs used in cutaneous and throat medicine.—*Counter-irritation*.—Vesicants, caustics, cautery, moxa, issues, setons, friction, shampooing.

Constitutional agents.—*General blood-letting*.—Indications for. Severe inflammations of the contents of the thorax following comparatively slight injuries and attended with a frequent, full, and hard pulse. The bleeding should be full and free from a large vein (e.g. median basilic), but not pushed to fainting. Repeat if necessary, and if immediate result of first bleeding be encouraging. Amount, usually about 10 ounces. *Diet*.—Abstinence from food. Low diet. Former may be prescribed for a few days in some cases of abdominal injury and inflammation. Low diet almost always beneficial. Stimulation; full diet; extra nourishment, for cases of low type, when the general weakness seems more threatening than the local inflammation. *Drugs*.—Mercury, antimony, aconite, belladonna, purgatives, diuretics, colchicum, iodide of potassium, quinine, pilocarpine, opium, other anodynes.—See some book on *Therapeutics*, and the notices of inflammation of special parts or of specific origin in this book. Aconite very valuable. *Diaphoresis*.—Effectuated either by drugs (antimony, Dover's powder, pilocarpine), or by hot-air baths, blankets, or other physical agents. *Spinal ice-bag, spinal hot-water bag*.—According to Dr. Chapman, former, by partially paralysing vaso-motor system, increases the flow of blood to that part of the body which corresponds to the region of the spine to which the ice-bag is applied—e.g., pelvic organs become actively congested and feet warm when ice-bag is applied to lower part of spine. On the other hand, the hot-water spinal bag has an action the very reverse of this; hence the ice-bag can be used to obtain a derivative action, and the hot-water bag to directly contract the arterioles of an inflamed part.

C. Differences in treatment, according to whether the Inflammation is Acute or Chronic.—In acute cases the indications are usually to save life, to check the attack before serious local mischief has been effected, to prevent the spread of a localised inflammation, and to relieve pain. In treating

chronic cases the surgeon has rather to attempt the removal of what may be termed pathological habits, and their causes and effects. In acute cases he employs such active agents as venesection, free leeching, and the administration of drugs which powerfully affect the nervous and vascular systems (*e.g.* opium and aconite). In chronic cases resort is often had to pressure, friction, counter-irritation, and stimulant or astringent drugs locally (*e.g.* silver nitrate), with 'alteratives' internally (*e.g.* mercury, iodide of potassium, sarsaparilla). Local rest. In most acute cases, general rest is imperatively indicated. In chronic inflammation, on the other hand, fresh air and outdoor exercise are often far more beneficial. It is especially in many chronic cases that a tonic and generous plan of treatment has to be adopted. In dealing with chronic inflammations always seek for some long-acting cause, or for some specific influence (*e.g.* syphilis, tubercle, rheumatism).

Insects, Stings of. *See BEES, STINGS OF.*

Intestinal Obstruction.—*Causes.*—1, intussusception ; 2, strangulation by bands or by congenital diverticula ; 3, volvulus or twisting ; 4, internal and external hernia ; 5, strictures—malignant, cicatricial, or simple ; 6, pressure of tumours or dragging of the bowel out of place ; 7, impaction of faeces or of foreign bodies ; 8, pouching of intestine ; 9, intestinal paralysis. According to Pollock, of 135 cases, 24 arose from intussusception, 36 from bands, diverticula, and the like, 33 from intrinsic stricture, 8 from internal hernia, 7 from concretions, calculi, and foreign bodies, 4 from volvulus of sigmoid flexure, 3 from faecal accumulations, 9 from peritoneal adhesions, tubercle, &c. ; and 8 were doubtful. *Pathology.*—1. *Intussusception.*—Portion of intestine, usually lower end of ileum, becomes invaginated in the portion immediately below it. If the case proceeds, the further invagination takes place chiefly at the expense of the lower, that is, the containing part of the bowel—*e.g.*, an intussusception commencing at the lower part of the small intestine will gradually absorb cæcum, ascending colon, &c., till the cæcum appear even out of the anus. Of course a section of an intussusception would show three concentric cylinders, of which the inmost and middle present

serous surfaces towards each other, while the middle and outermost touch each other on their mucous surfaces. Between the inmost and middle cylinders is the mesentery, tapering to a point at the lower end of the involution and causing an arching of the involuted part of the intestine towards its mesenteric border. The orifice at the lower end of the central cylinder, namely, that which opens into the bowel below the disease, is a slit and not circular. Peritonitis and adhesions usually occur, though often not till very late in the course of the case. Enteritis occurs and causes mucous and bloody stools. The natural process of cure is for the involuted intestine to inflame, become strangulated, slough, and come away *per anum*. 2. Strangulation by *bands* or by *congenital diverticula*.—Bands are usually adhesions of inflammatory origin ; they are often attached to diverticula. Diverticula are mostly found near the lower end of the ileum. They originate either from a partial persistence of the omphalo-mesenteric duct or from a hernia of the mucous coat of the bowel. 3. *Volvulus*.—Three varieties: 1st, when bowel is rotated on its own axis, only occurs in ascending colon ; 2nd, when mesentery forms the axis and is twisted into a cone, only occurs in small intestine ; 3rd, when one coil of intestine forms the axis round which another coil is bent. Most volvuli occur in sigmoid flexure. Loose flabby mesentery usually found in these cases. 4. *Internal herniae*. See HERNIA. 5. *Strictures*. Almost all occur in large intestine. Causes :—Cicatrices of tuberculous or of dysenteric ulcers, or of ulcers caused by irritation of foreign bodies ; inflammatory effusion and contraction in the substance of the intestinal wall ; syphilis ; cancer. The last cause is the most common. The pathology of the remaining causes of intestinal obstruction need not be considered in detail here.

Signs.—Vomiting, constipation, abdominal pain ; constitutional depression ; there are modified and special symptoms added according to prime cause.

Diagnosis.—1st, from other diseases causing vomiting, constipation, and pain ; 2nd, of the particular nature of a given case of obstruction. 1st, bear in mind possibility that the symptoms are caused by peritonitis, perityphlitis, passage of a

gallstone, impaction of a calculus in the ureter. Abstract of Mr. J. Hutchinson's memoranda for diagnosis. 1. If patient be a child, and the onset of symptoms be sudden—probably intussusception or peritonitis. 2. If an elderly person—impaction of faeces, or else malignant disease (stricture or tumour). 3. Middle age—intussusception and malignant disease very unusual. 4. Intussusception causes frequent straining, passage of blood and mucus, incompleteness of constipation, discovery of a sausage-like tumour either *per anum* or through abdominal walls. 5. Also in intussusception, parietes usually lax, and therefore it is almost always possible to feel the sausage-like tumour by manipulation under ether. 6. Malignant stricture. Old person, continued abdominal uneasiness, repeated attacks of temporary constipation. Constipation often not complete. 7. Tumour should be discoverable either through parietes or else *per anum* or *per vaginam*. Beware of confounding with scybalous masses. (Latter may probably be indented or pressed into a different shape.) 8. If there have been repeated attacks of dangerous obstruction with long intervals of perfect health, suspect diverticula, or bands, or pouching with liability to twist (volvulus). 9. Abdomen hard and distended from near commencement of case, peritonitis almost certainly. 10. Intestines visibly rolling about; almost certainly no peritonitis. 11. The tendency to vomit is in proportion to (1) nearness of impediment to stomach, (2) tightness of constriction, (3) persistence with which food and medicine have been given by the mouth. 12. Vomiting often absent in cases of obstruction in the colon or rectum. 13. Violent retching and bile-vomiting often more troublesome in cases of gall-stones or renal calculus simulating obstruction than in true conditions of the latter. 14. Faecal vomiting can occur only when the obstruction is moderately low down. When happening early in the case, it is very serious, as it implies tightness of constriction. 15. Hand in rectum may obtain useful information.

Treatment.—First question is that of laparotomy. Indications for laparotomy are a probable diagnosis of intussusception, strangulation by band, volvulus, or internal hernia. Of

course in many of these cases other means should have been tried fairly, but not long before resorting to abdominal section.¹ It is to be remembered, on the one hand, that most operations of the kind have been fatal, while many cases presenting bad symptoms have recovered spontaneously ; on the other hand, there are cases in which hope of spontaneous recovery is out of the question. Antiseptic precautions. In cases of incurable stricture the rule is to form an artificial anus.

Vide Colotomy. Enemata of solutions of sodic carbonate and tartaric acid, successively, as well as injections of air, have been used to dilate the intestines below the point of obstruction, and thus mark out its situation. If upper part of large intestine be found empty, bring a coil of small intestine into wound. In certain cases of insuperable obstruction, in which the seat of disease is believed to be above the cæcum, small intestine may be opened through anterior abdominal wall. Doubtless the operation of *Colectomy* (*q. v.*) is destined to supersede colotomy in suitable cases. In this, the diseased part of the bowel is excised. Afterwards the continuity of the bowel may be restored by uniting the two ends with sutures, or an artificial anus may be formed. If the former plan be adopted, the sutures should be very numerous and should not pass through the mucous membrane. *Measures not involving cutting operations.*—In all early stages, and in all acute cases, abstain entirely from giving either food or medicine by the mouth. Make a careful examination under ether administered fully. Copious fluid enemata. Insufflation of air. Latter, though good in intussusception, not to be used where stricture is suspected. For severe pain, give opium or morphia with belladonna. Employ abdominal taxis, that is, anaesthetise the patient, invert him, shake him, forcibly knead abdomen, give enemata in inverted position, prescribe prone position with pelvis elevated. Seat of pain may indicate seat of obstruction. Bands are usually found in umbilical region. When, during laparotomy, the intestines are

¹ On Laparotomy for Intestinal Obstruction consult two excellent articles by Treves and Greig Smith respectively, in *Brit. Med. Journ.* Aug. 29, 1885. A good review of the subject by L. S. Pilcher, in *Annals of Surgery*, March, 1886.

allowed to escape freely, considerable difficulty in returning them is likely to occur. Still it is sometimes necessary to allow it to a certain extent, care being taken to prevent escape of faeces into peritoneal cavity. In cases of difficulty, puncture may be justifiable, to facilitate their return. A loop of congested intestine is almost a sure guide to the seat of strangulation.

Intussusception. *See* preceding notice of INTESTINAL OBSTRUCTION.

Irrigation.—Practice of passing a continuous stream of water, usually cold, over a wound. Various apparatus. Wide-necked bottle, with skein of worsted or strip of lint acting as a capillary syphon. Tins and india-rubber tubes. The bend where the india-rubber tubing passes over edge of vessel may be prevented from closing tubing up by lashing the curve in the tubing to a metal skewer bent into a gentle curve, or by passing it loosely through a piece of gas-pipe. Water may be medicated. Objects of irrigation are to remove injurious discharges as fast as they are formed, and to keep down inflammation by action of cold. It is also used, especially in Germany, as a substitute for the spray during antiseptic operations, the fluid employed being generally carbolic lotion (1-40).

Iritis. *See* the OPHTHALMIC APPENDIX.

Ischio-rectal Abscess.—Acute or chronic. Former usually occurs in strong constitutions, latter in weakly persons. Swinford Edwards classifies into four varieties, viz., 1, subcutaneous ; 2, arising in the cellular tissue of the fossa ; 3, between the levator ani and the bowel—*i.e.* very deep ; 4, submucous. Of course, an abscess originating in one of these positions may spread to the others. Such cases as lead to 'fistula' mostly begin 'beneath the skin just outside anus' (Allingham). A classification might be made into tubercular and non-tubercular. The former present usually the characteristic signs of strumous abscess, and are sometimes associated with tubercle co-existing elsewhere. **Symptoms.**—Signs common to abscess everywhere. Chronic cases tend to spread nearly round rectum, and to form sinuses which may on the one hand burrow into buttock, and on the other become 'fistulæ in ano.'

Causes.—Blows, kicks, falls, and fissures, ulcerations, impaction of foreign body in rectum, tubercle. *Treatment.*—Acute abscess requires poultices, fomentations, and ordinary treatment. Both acute and chronic abscesses should be opened early by free incision to lessen danger of fistula. The cavity should also be scraped out and iodoformed gauze or wool placed inside it. Treat general health.

Jaws, Diseases of [partly noticed under heading ANTRUM, DISEASES OF].

JAWS, CLOSURE OF.—*Causes.*—1 (rare), ankylosis of temporo-maxillary articulation ; 2 (usual), cicatricial contraction after burns, scalds, cancrum oris, &c. *Treatment.*—In some cases the mouth may be forced open, and the cicatrix stretched by screw appliances. But in many cases the only hope of relief lies in osteotomy or resection. Two methods of osteotomy, one from within mouth (Rizzoli's), the other from without (Esmarch's). In the latter, which is preferred, a wedge-shaped piece of bone is cut out of lower jaw anterior to cicatrix. One operation for temporo-maxillary ankylosis consists in operating within the mouth, and cutting piece of bone out of ramus of jaw. The joint can be resected with a chisel (Bothier, Koenig) through an incision along the lower border of the zygomatic arch (H. R. Ranke). The coronoid process may have to be excised at the same time.

JAWS, NECROSIS OF.—*Causes.*—Blows, exanthemata, syphilis, salivation by mercury, chronic irritation of carious teeth, fumes of phosphorus. Cause sometimes obscure. *Signs.*—First, those of osteitis, pain like toothache, swelling, &c. ; then suppuration, formation of sinuses, detection of exposed bone, offensive discharge. Effect on general health usually greater than that of necrosis elsewhere. *Pathology.*—That of other necroses. Phosphorus-necrosis is said to occur only where there are carious teeth ; but Langenbeck denies this. Formation of new bone usually redundant ; but it tends to waste when the sequestrum is removed. A sinus opening externally near jaw sometimes merely signifies a carious tooth. *Treatment.*—Treat the cause. Remove sequestrum when it has fairly loosened, but not before. Avoid cutting skin if pos-

sible ; if unavoidable, make incisions below edge of jaw, and, in males, where whiskers may cover scar. Whole jaw has been removed piecemeal through mouth. Gargles and lotions of Condyl's fluid, borax, salicylic acid. In severe cases rest may have to be secured by bandages and guttapercha or other splints. Tonics, soft nutritious food, fresh air. Fit artificial teeth to new jaw. Specific remedies where indicated. Lower jaw affected oftener than upper. Amorphous phosphorus does not give off the injurious fumes.

JAWS, TUMOURS OF, may be cystic, fibro-cystic, fibrous, sarcomatous, carcinomatous, cartilaginous, fibro-cartilaginous, or osseous. A fibrous or sarcomatous tumour connected with the periosteum of the alveoli is called an 'epulis.' This has been noticed under that heading. Cystic tumours are the most common, and are noticed among the diseases of the **ANTRUM**, *quod vide*. Cartilaginous tumours are rare, but may be very large. Exostoses on the jaw are often of the ivory variety. *Diagnosis.*—See article on **TUMOURS** in general. The chief point is to recognise innocency or malignancy. Malignant growths increase rapidly, are usually softish, infiltrate neighbouring parts, affect glands, are painful, and sooner or later tend to fungate. *Treatment.*—Open simple cysts by a very free incision, stuff with iodoform gauze, and allow to granulate up. Other tumours must be removed thoroughly with knife, small saw, and cutting pliers. Bad cases may require removal of part or even whole of jaw itself. *See EXCISION OF JAW.*

EXCISION OF LOWER JAW.—Partial or complete. Done for tumour of the bone. *Incision.*—Depends on extent of bone to be removed. Considerable portions can be taken away through an incision entirely within the mouth. Larger portions require an incision along the lower margin of the jaw and chin. This, if necessary, may be extended upwards in the median line towards the lip, but only tumours of rare magnitude justify division of the lip itself. A tumour which reached from two inches above the zygoma nearly down to the clavicle required a curved incision from the front of the ear to and through the lower lip. Many tumours may be almost entirely separated from their connections before even the facial artery need be

divided. In the large tumour above referred to, this artery was cut by the last touch of the knife, and tied almost before it spurted. All bleeding vessels should be secured without delay, as free haemorrhage is peculiarly embarrassing in operations about the mouth. In the smaller tumours, a tooth is extracted on each side of the growth, and the jaw partially sawn through and partially divided by cutting forceps. When the symphysis has to be removed, the tongue must be perforated and held forward by a piece of whipcord, lest it fall back and close the glottis. This whipcord may be removed after twenty-four hours. When the ramus is encroached upon, disarticulation is necessary. Then keep the edge of the knife close to the bone, lest the internal maxillary artery be divided. Strong forceps may be useful. Depress the bone well, and open the joint from the front. Do not divide or remove any more mucous membrane that can be helped. It is worth remembering that, in case of dangerous haemorrhage after an extensive operation of this kind, the external carotid, or even the bifurcation of the common carotid, can easily be compressed between the finger in the pharynx and the thumb on the skin of the neck. Anaesthesia should be effected through Trendelenburg's trachea-tampon and tube, or Mills' apparatus.

EXCISION OF UPPER JAW.—Complete or partial. Performed for tumour of the bone. *Complete excision.* Incise skin, &c., down to bone along a line through middle of upper lip, round ala of nose, up to near inner canthus of eye, and lastly along lower margin of orbit. Very large growths may require also a cut through cheek from angle of mouth to malar bone. Turn this flap out and divide bone in the following places, in whatever order may be found most convenient in each individual case, but preferably as follows:—(1) Zygoma, (2) outer wall of orbit into spheno-maxillary fissure, (3) inner angle of orbit, (4) hard palate and alveolar process, through socket of central incisor tooth, previously extracted. Effect each division with cutting-forceps; but commence each, except the third, with a narrow saw. Now apply lion-forceps, depress the bone, separate remaining adhesions with fingers rather than with knife,

and wrench out. Avoid unnecessary injury to soft parts of palate. The removal is comparatively easy in a child, because the sutures are much less firm (H. Marsh). Arrest haemorrhage, pad the cavity with iodoform gauze, replace the cheek flap. Suture. Hare-lip pins through lip. *Prognosis.*—Large majority of cases recover. Chief dangers, haemorrhage and blood-poisoning. Death on operating table perhaps commoner in operations about jaw than in any others.

Partial Excision of Upper Jaw.—There are growths which affect so limited a part of the upper jaw that it is unnecessary to remove the whole bone for them. The orbital part may be excised and the palate left, or *vice versa*. Still more limited operations sometimes suffice. The external excision is done in the same line as that for total excision, but made no longer than is necessary in each case.

Joints, Diseases of.—1. Acute synovitis. 2. Acute suppuration (or abscess, or acute suppurative synovitis). 3. Acute osteitis of a joint (inflammation of the articular end of a bone). 4. Chronic synovitis, with which is usually considered hydrops articuli. 5. Chronic 'joint disease.' White swelling. Strumous joint (including both 'pulpy degeneration of synovial membrane,' and 'ulceration of cartilages'). 6. Chronic rheumatic arthritis (rheumatic gout). 7. Acute rheumatism. 8. Gout. 9. Gonorrhœal rheumatism. 10. Pyæmic arthritis. 11. Puerperal rheumatism. (From 7 to 11 commonly called specific inflammations.) 12. Charcot's joint-disease. 13. Loose cartilages. 14. Ankylosis. 15. Neuralgia of joints. 16. Neuro-mimetic or hysterical joints. 'Of late, great importance has been attached (especially by French surgeons) to speaking, first, of diseases of the synovial membrane, then of those of the cartilage, articular capsule, and bone, corresponding to the anatomical conditions. Correct as this division would be if it were only a question of representing the pathological anatomical changes, it is of little use in practice. The surgeon always views inflammation of the joint as a whole, and although he should know what part of the joint suffers most, this is only a part of what he should know; course, symptoms, and constitutional state equally demand his attention and determine the treat-

ment. Hence the entire clinical appearance will determine the divisions of this, as of many other diseases.'—Billroth.

So-called 'metastatic' inflammations of joints, following attacks of the acute exanthemata, are sometimes pyæmic and sometimes tuberculous, but it is not impossible that others may be specific and directly due to the fever poison itself.

ACUTE SYNOVITIS.—*Causes.*—Exposure to cold. Blows or sprains. Syphilis, rheumatism, &c. But specific inflammations are noticed separately. *Signs.*—Pain, heat, and swelling, but not usually redness. Great tenderness. Swelling has a characteristic shape, bulging out exactly where the synovial membrane would tend to pouch when distended. Fluctuation. Tension sometimes great enough to almost prevent fluctuation. Feverishness. *Pathology.*—Synovial membrane is actively congested, and cavity of joint distended with sero-synovial fluid, usually clear, but occasionally containing a few corpuscles or a little blood. *Prognosis.*—As a rule good, unless constitution be bad or treatment neglected. *Diagnosis.*—Distinguish from acute inflammation of any neighbouring bursa. Consider position and shape of swelling and history of case. *Treatment.*—Rest; splint or 'fixed apparatus.' Attend to position according to joint affected. Cold. Pressure. Wet bandages. Cotton-wool compress and bandage over it. Leeches. Hot fomentations. Dover's powder internally. For specific cases give specific drugs.

ACUTE SUPPURATION OR ACUTE ABSCESS OF JOINT.—*Causes.* Sometimes one or more of the causes of ordinary acute synovitis. Sometimes the opening into the joint of an abscess in the neighbouring soft tissues or bone. The commonest cause is a wound of the joint. *Signs and Diagnosis.*—Acute pain and swelling; redness and œdema, which may disguise fluctuation. Fixation in some position peculiar to each joint—e.g. flexion and external rotation in case of knee-joint. High fever and rigors. After a time fluctuation appears, not only in the joint, but often also in its neighbourhood (secondary abscesses). High fever continues. To distinguish a superficial abscess near a joint from acute articular suppuration, notice that in the former case the symptoms are so localised that some part of the joint will be accessible to examination, and be found healthy. The centre of

an extra-articular inflammation will perhaps be noticed to correspond to some bursa, or to some superficial injury. *Prognosis.*—Destruction of joint very probable. Danger to life great in old age, if joint be a large one. Danger of pyæmia. Best result that can usually be expected is ankylosis in good position. Complete recovery from early stage possible. *Pathology.*—In early stage, synovial membrane is red, greatly swollen, puffy, and infiltrated with corpuscles and serum. Contents of joint are synovia mixed with more or less pus. In later stage, synovial membrane is red, covered with fibrous rinds, and partly ulcerated, the contents of the joint are thick yellow pus, mixed with fibrous flocculi, the cartilage is breaking down, and even the adjacent cancellous bone inflamed. *Treatment.*—Aspirator may be used to confirm diagnosis. Then make, in a dependent position, an opening large enough to let out the pus and admit a fair-sized drainage-tube. Wash out with carbolic lotion (1-40), inject saturated ethereal solution of iodoform (three or four drachms into an adult knee-joint). Dress antiseptically. Place the joint in a suitable position. Pad both limb and joint freely with cotton-wool. Then apply a fixed apparatus (plaster of Paris or starch and millboard) from near the extremity of the limb to a considerable distance above the joint affected. Be extremely careful to bandage evenly. Place ice-bags over joint. Give morphia subcutaneously. Elevate limb. Great benefit is often derived from extension by weights. If there are signs of extensive disease, open the joint more freely to scrape away granulations and carious bone. Do this thoroughly in every corner of the articulation and fold of its synovial membrane. Follow up with iodoform and drainage as before. If the abscess be already septic, and so connected with sinuses, &c., that it cannot be thoroughly asepticised, both abscess and sinuses should, drainage-tubes having been inserted, be injected with the following lotion, three times a day, until recovery takes place: Rx Bismuth. trisnit. 3*iiij.*; zinci sulph., plumbi acet., $\frac{aa}{a}$ 3*j.*; glycerini 3*j.*; aquæ ad 3*xx.* It should be shaken up when used. As much iodoform as bismuth may be added. Of course, bear in mind

the possibility of bismuth, lead, &c., poisoning. I have, however, used the above lotion very extensively without any unpleasant consequences, and with the best results as regards diminishing fever and suppuration, as well as promoting cicatrisation. If the case fails to do well, amputation may be required.

ACUTE OSTEITIS OF A JOINT. *Inflammation of the Articular End of a Bone.*—Inflammation of spongy bone-substance adjacent to a joint is very rarely acute; though chronic joint-disease frequently begins in the bone. *Causes.*—Obscure, when the affection cannot be traced to injury. (See 'Osteo-myelitis' in section on 'Bones, Diseases of.') *Signs and Pathology.*—Those of OSTEITIS, *quod vide.* Pain, heat, and swelling. Redness combined with œdema when suppuration occurs. Synovial membrane of adjacent joint becomes implicated. Effusion into joint. In childhood, whole articular epiphysis may separate. Partial necrosis more probable in adults. *Diagnosis.*—The disease may be known to have begun in the bone by the signs and history of osteitis. Until the whole joint has become infected, there is an absence of the synovial thickening characteristic of pulpy synovitis. In the latter affection there is generally much less pain and tenderness. *Prognosis.*—Danger of acute articular abscess, or, in the event of acute inflammation being allayed, of chronic destructive disease of the joint. *Treatment.*—See INFLAMMATION OF BONE. Rest, elevation, fixation, cold, painting with iodine, &c. After a fair and not too long trial of these means, the question of operative treatment should be entertained. Formerly the choice lay between excision and amputation; but Volkmann's spoon seems likely to drive the saw nearly out of the field. (See treatment of 'Chronic Joint-Disease.') In osteitis of the articular end of a bone, there is a stage before the joint itself becomes affected. Then Hueter used to inject, with a hypodermic syringe, lotio carbolici (1-50 or 1-20) right into the diseased bone. Other surgeons have used the gauge and the erosion-spoon at this stage. These instruments should be used thoroughly, care only being taken to preserve intact both the so-called 'epiphysial' and the articular

cartilage. The diaphysis grows from the former, the epiphysis from the latter.¹

CHRONIC SYNOVITIS. HYDROPS ARTICULI.—*Causes.*—Same as those of acute synovitis, of which affection it is usually a sequel. Sometimes, but rarely, due to tuberculosis of the synovial membrane. *Signs.*—Almost always attacks the knee. Young men most liable. Swelling and fluctuation of all the synovial pouches of the joint. Little or no pain or tenderness. The use of the joint is sometimes not much impeded, but there are usually fatigue and pain. *Diagnosis.*—From white swelling, by the absence of apparent thickening of the articular ends of the bones, of signs of ulceration of cartilage, of the great wasting of the limb, which almost always occurs in chronic destructive diseases of the joint, but above all by amount of effusion. In early stage, age should be considered. Hydrops occurs chiefly in young adults, strumous disease mostly in children. *Prognosis.*—Little or no danger of hydrops articuli leading to any destructive joint-disease. Relapse after cure very common. *Treatment.*—Perfect rest, counter-irritation, and compression with the strong elastic bandage. By means of a soft elastic bag containing water and placed beneath the elastic bandage, the pressure can be measured and regulated to a nicety, without removing the bandage. I have found the hydraulic pressure of a column of water 28 inches high sufficient; but this point must vary with the case. Scott's dressing. But, unless these means are *speedily* successful, joint should be tapped and drained with antiseptic precautions. To prevent relapse it is necessary to insist upon the patient's wearing a common elastic bandage round his joint for months after leaving hospital. Treat the tuberculous form by injecting ethereal solution of iodoform, drainage and fixation.

CHRONIC SYNOVITIS IN HEREDITARY SYPHILIS.—*Age.*—8 to 21. Like syphilitic keratitis, always symmetrical, painless. Readily yields to mercury and iodide. Well described by Clutton in *Lancet*, Feb. 27, 1886.

¹ There is an excellent clinical lecture by Greig Smith, on the operative treatment of the affection under consideration, in the *Lancet*, Dec. 24 and 31, 1881.

CHRONIC JOINT-DISEASE. *White Swelling. Strumous Disease of Joints.* Including *Pulpy Degeneration of Synovial Membrane, 'Ulceration of Cartilage'* (and *Articular Osteitis* when it leads to chronic degeneration of the adjacent joint).—To anyone more familiar with chronic joint-disease in books than in the human body the above long heading may seem unnecessarily fraught with confusion. But I trust that it is not so ; for, although some of the above terms represent different conditions at the outbreak of disease and for a short time afterwards, yet these different commencements almost always tend towards the same course and termination, viz., implication of every element of the joint, synovial membrane, cartilage, bone-surface, and ligaments. There are numbers of diseased joints which, even when exposed to the eye by operation, or death, do not reveal the origin of their disorganisation. Moreover, in deciding upon a plan of treatment, one considers not so much what was the commencement as what is the present state; not what was, but what is, determines the decision. However, care will be taken in the following notes not to lose sight of anatomical distinctions. *Causes.*—Many cases follow blows or falls, or exposure to cold or wet. It is still customary to say that 'a strumous constitution predisposes' ; but if it be true that chronic joint-disease depends upon the presence of the tubercle bacillus, it can scarcely be correct to speak of struma as a diathesis, or a 'predisposing' cause; for the bacillus must be regarded as the very essence of the disease. As any acute inflammation of a joint may become chronic, so every cause of acute may also be a cause of a corresponding form of chronic arthritis. But it is rare for gout, syphilis, or acute rheumatism to lead to destructive inflammation of a joint. *Pathology.*—Commencement may be in synovial membrane (possibly after blows, cold, or specific disease), or in ligaments (usually after sprains), or in bone ; but, according to modern pathology, seldom or never in cartilage. When the synovial membrane is affected primarily, the result is Brodie's 'pulpy degeneration of synovial membrane.' The patient is usually middle-aged or elderly, and the joint affected, the knee. In this disease parts of the synovial membrane swell, look œdematous, pulpy, red-

dish-grey, and soft. This condition spreads, eating up, so to speak, the underlying cartilage. The microscopical structure of the pads and tufts of swollen synovial membrane becomes identical with that of vascular granulations. The tubercle bacillus can be found in them, but not in large numbers, and sometimes only with considerable difficulty (*see 'Tubercle'*). In the subjacent layer of cartilage which is in process of conversion to the same granulation-tissue, the cartilage cells themselves divide, proliferate, and assist in the dissolution of the matrix of their own cartilage. In this way the pulpy tissue reaches the bone. The process does not stop here, but the bone itself inflames, erodes, and now the joint is carious. In the meantime the ligamentous structures of the joint have been softening, thickening, and, in some places, perhaps, yielding to the encroachments of the pulpy tissue, which may even pierce the skin and present externally as a fungous granulation. At the same time that the synovial outgrowths are destroying the cartilage, destructive inflammation may appear in the articular lamella of the bone, so that the cartilage is attacked both above and below, like a whale between a 'thrasher' and a sword-fish. When the disease begins in the ligaments it is usually in the hip or knee-joints, which have internal ligaments. From these it spreads to either the synovial membrane or the bone, or to both. Then the features of the case cease to have anything to distinguish them from those of disease originating elsewhere. The frequency with which disease begins in the ligaments is a point not yet settled. *Disease beginning in the bone.*—This is the usual mode of commencement, especially in children. The prime appearances are those of Inflammation of Bone, *quod vide*. In the beginning are formed small circumscribed tubercular foci. There may be more than one, rarely more than two or three in the same epiphysis. Sometimes two different bones or both epiphyses of the same bone are affected. It is quite the exception for these foci to generalise themselves, as it were, and infiltrate the whole epiphysis. It is, therefore, often long before they affect the neighbouring joint, which, indeed, often escapes altogether. Sometimes the joint becomes implicated,

because the inflammatory action in the articular lamella spreads to or separates the cartilage. Sometimes necrosis or caries leads to abscess which bursts into the joint. The course of events leads to synovitis, which spreads all round the joint, to pulpy thickening of the synovial membrane, and to its usual results, as described above, on both faces of the joint. *However the disease may begin*, if it go on, the ligaments give way, the ends of the bones become displaced, and perhaps necrose wholly or partially. Suppuration and the formation of sinuses often do not occur, especially when the patient, excepting his articular disease, is healthy. The most profuse suppuration occurs when acute suppurative synovitis becomes chronic.

Symptoms and Course.—Insidiousness of first stage (unless affection is a sequel of acute disease). In case of joints of lower extremity, limping, occasional complaints of pain or weakness. Surgeon soon detects signs of a synovitis, marked much more by thickening of synovial membrane than by effusion into joint. See notices under names of individual joints, *e.g.* HIP-JOINT. Or the first symptoms observable may be those of articular osteitis. The limb assumes a peculiar appearance, distinguished by the swelling and pallor of the diseased joint and by the wasting of the muscles. The joint assumes a bent position. At a later stage dislocation takes place. Suppuration may occur at any time, or not at all. *Sinuses.* Fungous granulations. When bone becomes affected, starting pains at night, excruciating pain on sudden movement or on pressing joint-surfaces together. Sometimes secondary abscesses. Grating may indicate roughness of cartilages. Necrosis may be guessed at from the history or from occurrence of marked crepitus, but can only be certainly known when joint is open. Probe may not detect caries when granulations cover the diseased bone. Granulations fungating through a sinus almost always indicate caries. *Prognosis.*—Depends on (1) patient's constitution, (2) his nutritive condition, (3) his command of time and money, (4) the joint affected, (5) the anatomical origin of the disease, (6) the treatment adopted. In the present transitional state of surgery, No. 6 assumes great importance. The surgeon who has confidence in fixation,

erasion, iodoform, drainage, and antisepsis, regards most 'strumous' joints as curable (though with a remanent ankylosis), provided only that the joint be accessible to his operations, and that the patient be not tuberculous elsewhere. If time, and fresh, pure dry air be granted, accurately fitting cases of plaster of Paris usually give good results. A great deal which bears on prognosis is contained in the following observations on *Treatment*.—General and local. *General*.—Indications : (1) to improve nutritive condition, (2) to obtain best possible conditions of pure air, especially sea air, cheerful light, sound sleep, &c. In most cases general rest, in the sense of total confinement to bed, not desirable. Rather combine general, out-door, moderate exercise, with local rest. But long intervals of repose and gentleness of exercise essential. Cod-liver oil, iron, quinine, milk, &c., according to special features of case. *Local Treatment*.—Indications : (1) perfect rest, (2) one or more of the following remedies :—A firm plaster case over a flannel bandage, and extending from some way below to a considerable distance above the joint affected. Instead of plaster of Paris, starched bandage and millboard are sometimes used. Scott's dressing, *i.e.* ungu. hydrarg. co. rubbed on joint, and then strips of pitch plaster spread on leather applied to it. Gentle uniform pressure with elastic bandage such as 'Martin's.' Extension by weights. Splints. Elevation. Suspension in Salter's swing. Continuous cold ; ice-bags. Counter-irritation. 'Firing.' Blisters. Injection of saturated solution of iodoform in ether (about 5 ij). Teale recommends subcutaneous incision of the capsule of the joint in the early stage of chronic joint-disease. At a certain stage arises the question of the desirability of performing erasion, or excision, or even amputation. Concerning erasion; *see* remarks in section on *Strumous disease of bone*. In erasing joints, use large incisions, so that you may see thoroughly, for all diseased, soft as well as hard, tissues, must be scraped, clipped, or chipped away. Volkmann bids us not to forget that the tubercle *infiltrates* the synovial—does not merely lie on it in a loose and easily removable membrane, as in intermuscular abscesses, &c. While excision may not very rarely be useful in the elbow and

hip, and sometimes in the wrist, it can seldom be desirable in the shoulder (except after gunshot wounds or compound fracture). See articles EXCISION OF JOINT and AMPUTATION. Suppuration and free discharge do not counter-indicate plaster cases. Small windows can be cut in the case, and gutta-percha tissue, &c., used to protect it. These windows should be really small, i.e. not large enough to spoil the case as a uniformly supporting agent. Perfect fixation is one of the most powerful agents for diminishing discharge.

CHRONIC RHEUMATIC ARTHRITIS. RHEUMATIC GOUT.—See RHEUMATISM.

DEPOSITS IN JOINTS.—Urates, in cases of gout. Carbonate of lime in the cartilages. (Redfern.) Oxalate of lime on the articular surfaces. (Ditto.) Ammonio-magnesian phosphate. (Heschl.) All, except the urates, are very rare. The phosphates have only been observed in a single case, one of chronic rheumatic arthritis. (E. H. Bennett, *Dublin Med. Journ.*, vol. ii. 1882.)

GONORRHœAL RHEUMATISM.—An affection of the joints occurring in the course of a gonorrhœa. Relation of the two diseases uncertain. The arthritis may be due to blood-poisoning, or to reflex irritation through spinal cord. *Symptoms.*—It usually attacks knee, hip, wrist or ankle, especially knee. Pain, stiffness, swelling, heat; various degrees of acuteness or of chronicity. Seldom goes on to suppuration and disorganisation of joint. Usually confined to synovial membrane and ligamentous structures. *Pathology.*—The appearances of synovitis, osteitis, or abscess are not characteristic of their gonorrhœal origin. See above for pathology of Synovitis, &c. *Prognosis.*—Danger of ultimate ankylosis. Often complete recovery. Relapse may occur if gleet return. *Treatment.*—Cure the gonorrhœa or gleet. Treat the joint-affection according to the rules given above for the particular form of joint-inflammation each case of gonorrhœal rheumatism may most resemble. When chronic arthritis persists after gonorrhœa is cured, great benefit often derived from an elastic bandage, and ten-grain doses of pot. iod. *ter die*. Fraser says that salicylate of soda does no good in gonorrhœal rheumatism. I have cer-

tainly seen marked improvement attend its use in a few cases ; but the patients were taking pot. iod. and also ol. santalini at the same time. Indeed, in these troublesome cases, I give all these three remedies at once, for no better reason than that I have several times seen the practice attended by good, either as a result or a coincidence.

NOTE.—The muscular pains often occurring in the course of a gonorrhœa are by some classified as a form of gonorrhœal rheumatism. Cure the cause and direct flannel to be worn. Chloral may be necessary at night. Change of climate.

LOOSE CARTILAGES.—*Causes.*—1. They grow, like warts, on the synovial membrane, and afterwards break off. 2. They are, in rare cases, pieces chipped off the joint-cartilage itself. 3. There is also a theory of their formation by a process identical with that of 'Quiet Necrosis' (Paget's *Clin. Lect.* p. 343, and Teale). *Symptoms.*—Liability to sudden and sickening attacks of pain, caused by certain movements, and followed by synovial effusion. The loose cartilage may, in many instances, be felt near the superficial aspect of the joint. These symptoms make the *diagnosis* quite clear. *Pathology.*—Number usually single, but sometimes very numerous. Shape rounded, or flattened with rounded edges. Size from that of a shot to that of a broad bean or, in exceptional cases, much larger. Structure rarely cartilaginous, usually fibrous. Joint most commonly affected, the knee. *Treatment.*—1. India-rubber bandage and moderation in exercise of joint, especially restraint from violent motions. It is said that perseverance in this may cause permanent cessation of unpleasant symptoms, perhaps adhesion of the loose cartilage to a convenient part of the joint. 2. Operative. This must be either subcutaneous or immediate. *Subcutaneous excision.*—Fix the cartilage between the finger and thumb, or transfix it with a needle (Joseph Bell) ; then pass a tenotome through the skin at a distance, and, with it, divide the capsule of the joint until the cartilage can be squeezed out into the areolar tissue. Fix it there by strapping, &c., and place the limb on a splint, or in a plaster of Paris case. A week afterwards, if the surgeon choose, he may cut out the cartilage altogether. Even in this operation,

the knee, the surgeon's hands, instruments, and dressings should be asepticised.

Joints, Neuromimesis, or Hysteria of.—*Diagnosis* from 'organic' disease is based on the facts that, in neuromimesis, (1) the subjective symptoms—pain, tenderness, &c.—are often great while there is in the joint no alteration visible to the surgeon at all; (2) the pain and tenderness are often chiefly in the skin rather than in the joint itself; (3) the patient sometimes describes her sufferings in strong language, but in a cheerful manner, as though the recollection of them was not so very painful after all; (4) stiffness and contractions disappear under anaesthetics; (5) instead of being hotter than the healthy joints as in the case of inflammations, the affected joint is often colder; (6) other hysterical symptoms, and even a manifest cause for them, may co-exist. But bear in mind that hysterical patients are not exempt from organic disease, and that 'hysteria' itself even sometimes leads to actual alterations in the joints. This is not surprising, considering the intimate relations, pathologically as well as physiologically, between the spinal cord and the joints. *Treatment*.—Massage. See HYSTERIA. Refer to Paget's *Clin. Lect.*

Joint-Disease, Charcot's.—Preceded by the 'lightning pains' characteristic of tabes dorsalis or locomotor ataxy. The limb near the affected joint sometimes swells quickly and extensively, after some time returning again to its normal size. Spontaneous dislocations. Fractures caused by gentle movements. Accompanying signs of locomotor ataxy, *e.g.* more or less inco-ordination of movements and loss of muscular sense. But the affection frequently comes on in the early or 'pre-ataxic' stages of tabes. 'The very rapid and extreme wearing away of the articular extremities of the bones is the principal character which, from an anatomico-pathological point of view, distinguishes the arthropathies of ataxia from common rheumatic arthritis (*arthrite sèche*).' The condition of rapid swelling has been mistaken more than once for malignant disease. The crepitus has a peculiar 'scrunching' character. There is also little or no formation of osteophytes. Excellent model and specimens in St. Thomas's Hospital Museum.

Kidneys, Diseases of.—Frequently complicate, and are produced by bladder and urethral disorders, especially such as obstruct the flow of urine. *Amyloid* kidney is a common result of prolonged suppurations and of syphilis. According to Marcus Beck (his contribution on this subject to Erichsen's *Surgery* should be carefully read), such diseased conditions of the *Ureters and Pelves of the Kidneys* are met with in three chief forms, viz. 1, the result of simple over-distension without acute inflammation; 2, acute inflammation without signs of over-distension; 3, a combination of the two. Simple chronic over-distension leads to dilatations with a certain amount of thickening. The conditions of the kidney are classified as follows:—1, changes resulting from pressure by urinary obstruction; 2, acute interstitial inflammation; 3, acute interstitial inflammation with scattered abscesses; 4, the results of former acute and subacute attacks from which the patient has recovered. 1. *Pressure by Urinary Obstruction* causes dilatation of the kidney, absorption of the pyramids, cellular infiltration of the intertubular tissue (interstitial nephritis), and little or no change in the tubules themselves in the cortex. Capsule tough and adherent. In severe cases even the cortex is almost entirely atrophied, so that the kidney becomes a mere sac. 2. *Acute Diffuse Interstitial Inflammation.*—Kidney soft and swollen; capsule separates readily, but kidney-substance gives way during the separation. Surface mottled; section also mottled; cortex pale, but pyramids much congested. Microscopically, great cellular infiltration between the tubuli. In many parts tubuli are seen compressed or destroyed. Most infiltration round Malpighian bodies. 3. *Acute Interstitial Nephritis with Scattered Abscesses.*—Frequently coincident with acute pyelitis and putrid urine in pelvis of kidney. Kidney shows, in parts affected, signs of the condition described in the last paragraph (interstitial nephritis), and, in addition, scattered groups of bright yellow spots. These spots are minute abscesses. In certain cases this disease may advance to general suppuration of the whole kidney. 4. *Effects of former attacks from which the patient has recovered.*—These correspond to the changes which result from interstitial inflammations elsewhere. In mild

cases complete resolution is possible ; but in more severe ones cicatricial fibroid changes make the kidney contracted and tough, obliterating many of its glandular elements. The capsule is hard to separate ; many small cysts lie beneath it ; the cortex is greatly thinned ; but the pyramids are little altered. *Causes of Interstitial Inflammation.*—1, Tension ; 2, reflex irritation ; 3, septic matter in pelvis of kidney. The origin of reflex irritation in these cases is usually some disease in, injury to, or operation on the bladder and prostatic parts of the urethra ; but in Beck's opinion it is likely that 'in all cases of operation on the urethra there is a miniature representation of that intense congestion of the kidney which is found in cases of death from suppression of the urine after simple catheterism.'

SYMPTOMS OF KIDNEY-DISEASE IN SURGICAL AFFECTIONS OF THE GENITO-URINARY ORGANS.—Those of *simple dilatation* of the kidney are few. The most important are increased quantity and diminished specific gravity of the urine. The urine to be examined should be collected for twenty-four hours. *Sub-acute Interstitial Nephritis* is often obscured by the affection which has led to it—*e.g.* by vesical catarrh. But even in such circumstances a dry tongue, persistent nocturnal rises of temperature (rarely to above 101° F.), emaciation, and occasional nausea, are ominous symptoms. Urine copious : its specific gravity usually low.

Acute Interstitial Nephritis with Scattered Abscesses.—Begins with rigor and rise of temperature to 105° or 106° F. This may be repeated again and again. Tongue like broiled ham. Sordes. Nausea, vomiting. Rapid emaciation. Possibly diarrhoea. So-called 'typhoid' symptoms. Tenderness over kidneys. Muttering delirium. Patient sinks ; but the profound coma and convulsions of uræmic poisoning are exceptional. 'The urine varies much. It usually becomes more or less bloody, and in rare cases is suppressed, though much more frequently a considerable quantity is passed up to the time of death.' Much decomposed and mixed with mucus, pus, and blood. *Diagnosis* has to be made from (1) pyæmia, (2) peritonitis, (3) typhoid fever, (4) ague. 'From pyæmia the diagnosis is somewhat difficult, the most important point being the vomiting, the absence of secondary abscesses, the drowsy state into which the

patient soon falls, and the fact that the temperature often remains, for days before death, below normal.' The kind of vomiting and the course of temperature contrast with those of peritonitis. The temperature curves and the absence of spots distinguish from typhoid. In ague there should be complete intermissions. *Prognosis.*—In acute cases of 'surgical kidney' always bad, but most so in suppurative nephritis. *Treatment* of kidney-disease complicating surgical cases.—Rest. Avoid every source of genito-urinary irritation. If catheterism is unavoidable, use instruments thoroughly cleansed, oiled, and antiseptic. Treat the causes with mild and gentle means. For interstitial nephritis, dry-cup the loins, give purgatives, dress in flannel, stimulate the skin—*e.g.* by hot-air baths.¹

Knock-knee (Genu valgum).—A deformity in which the knee is bent inwards. *Causes.*—Rickets; habits of excessive standing, or of carrying heavy burdens. About puberty a disease is liable to attack the epiphysial cartilages somewhat analogous to the rachitis of childhood. These cartilages are then peculiarly liable to be influenced from the causes above mentioned. Hence many cases of genu valgum, and even spinal curvature. (See Mikulicz in v. Langenbeck's *Archiv*, xxiii. 3 and 4; and also Busch, *Die Belastungsdeformitäten der Gelenke*, Berlin, 1880.) *Anatomy.*—The diaphyses of the femur and tibia grow faster on the inner than on the outer side. Thus the internal condyle is pushed downwards, and the inner part of the upper epiphysis of the tibia upwards. At the same time the diaphyses sometimes grow curved with the convexity inwards. The patella tends outwards towards the external condyle. The internal lateral ligament is relaxed in cases which commence at or near puberty, but not in the knock-knee of rachitic children. *Treatment.*—In early age, ordinary cases can usually be cured by judicious and persevering use of splints or irons, and elastic force, combined with tonic medicines and hygiene. But this treatment is usually very slow, and often does more harm to the joint than good to the bones, stretching the ligaments, and masking rather than curing the deformity.

¹ See also 'Urethra, Stricture of,—Dangers of Catheterism.'

Operative procedures have often to be followed.¹ Such are (1) Ogston's, (2) Chiene's, (3) Macewen's, (4) Reeves's, on the femur, and (5) Barwell's, on femur, tibia, and fibula. M. Deloré forcibly bends the knee straight during anaesthesia, and then secures it (*see OSTEOCLASIS*). This procedure separates the inferior epiphysis of the femur. Ogston made a small incision through the skin and sawed off the internal condyle subcutaneously, and then easily brought the limb straight. Macewen chisels nearly through the femur above the condyles, and then puts the limb straight. This is a very satisfactory operation. Chiene's and Reeves's modes of operation differ from Ogston's in that the former removes a wedge of bone and therefore alters the joint-surface less, while the latter chisels up to, but not through, the articular cartilage. Chiene also uses the chisel. It is worse than useless to divide the tibia as well as the femur. Although the tibia is generally affected, sometimes even more than the femur, it is much easier to divide the latter than the former bone, and osteotomy of the femur is enough to obtain an excellent result, even in the worst cases. Ogston has given up his own operation, and prefers Macewen's. Osteotomies and fractures into joints are now known to be followed, only too often, by chronic rheumatoid arthritis. *See OSTEOTOMY.*

Labia.—The external genital organs of the female are liable to (1) hypertrophy, (2) cystic tumours, (3) venereal diseases, especially warts and ulcers, (4) epithelioma, (5) haematocele, (6) varix, (7) abscess, besides other affections of less frequent occurrence. Affections of the labia are modified by (1) the vaginal and vesical discharges to which they are so often exposed; (2) the hindrance to the circulation due to the dependent position of relaxed or hypertrophied labia; (3) the dirty habits of some patients. In treating them, beware of severe parenchymatous haemorrhage. *See article HÆMORRHAGE.*

Cysts of the labia are particularly frequent in young women, especially shortly after marriage. They are commonly caused

¹ It is difficult to give any concise and precise rules or indications for osteotomy in genu valgum. In each case the age of the patient, the amount of the deformity, its duration, its causes, its precise anatomical nature, and sometimes the effect upon it of treatment by splints and irons, have to be considered.

by hypertrophy of the follicles of the mucous glands. Lay them freely open and insert iodoform gauze in the cavity.

Hypertrophy of the labia, or of the *clitoris* usually originates in venereal inflammation, but persists after the cause is removed. *Treatment*.—Excision. Acupressure may be used to repress troublesome haemorrhage.

Congenital cohesion of the labia.—Easily remedied by tearing with the handle of a scalpel. Oil the surfaces well, and instruct the nurse to keep them separate with a piece of oiled lint for a few days.

Laparo-elytrotomy.—This most interesting and promising operation consists in opening the vagina after reaching it through an incision in the left groin, and then delivering the patient by the way thus made. The os uteri has of course to be fully dilated. It is a substitute for Cæsarian section, and is done in the same class of cases. Professor Skene of Brooklyn (who has performed it four times, thrice successfully as regards both mother and child) describes it in *The Annals of Surgery* for January 1885.

Laparotomy. *See ABDOMINAL SECTION.*

Larynx, Diseases of.—Acute catarrh (acute laryngitis). Chronic catarrh (including clergyman's sore-throat). Edema glottidis, syphilitic affections, phthisis, cancer, inflammation and necrosis of cartilages, tumours, foreign bodies, 'nervous' disorders (including laryngismus stridulus), stenosis.

LARYNX, ACUTE CATARRH OF. ACUTE LARYNGITIS.—*Causes*.—Cold, cold with damp; excessive shouting, speaking, or singing. Mechanical and chemical irritants. Scalds. Acute exacerbations sometimes supervene in cases of chronic catarrh. A larynx diseased from any cause is more liable to acute inflammation than a sound organ. Spread of a naso-pharyngeal catarrh to larynx. Influenza. Exanthemata—e.g. measles, small-pox, typhoid. Erysipelas may spread inwards to larynx. *Symptoms*.—Functional derangements, viz., loss of voice or hoarseness. Pain in throat near hyoid bone, perhaps tenderness in that region when swallowing. Tickling in throat. Hacking cough. At first scanty tenacious sputa, afterwards looser and more purulent. If the case progresses unfavourably, dyspnoea comes on, and this

is liable to sudden and most dangerous increase, during which tracheotomy or laryngotomy may be necessary to prevent asphyxia. The local symptoms are usually much more serious than the general. But more or less fever is present. *Pathology*.—Whole mucous tract of larynx is not always affected. The appearances are like those of mucous catarrhs elsewhere, *i.e.* swelling, redness, mucous, purulent, or sero-purulent exudation; occasionally, in severe cases, small sub-mucous haemorrhages. The dyspnoea mentioned above, when sudden, is partly or wholly spasmodic. But the most dangerous kind results from great serous effusion in the sub-mucous tissue of the glottis, '*œdema glottidis*.' After death the appearances are much less marked than when shown by the laryngoscope during life. *Diagnosis*.—Hoarseness, and occasionally dyspnoea, indicate larynx as the seat of affection. Laryngoscope will exhibit actual state of organ. Catarrhal laryngitis differs from croup in that, 1, the dyspnoea is not persistent, and varies more; 2, there is no false membrane; 3, there is usually less fever; 4, a known cause and history may point unmistakably to acute non-croupous laryngitis. *Prognosis*.—Very guarded, danger of sudden and fatal dyspnoea. Laryngotomy and tracheotomy, while they avert this danger, introduce others, such as pulmonary congestion. Recovery usually complete, but acute sometimes passes into chronic catarrh. *Treatment*.—Rest in a room of uniform and warm temperature. Atmosphere charged with steam. Hot moist sponge to throat. Low diet. Milk and soda water. Avoid greasy food. Salt food and saline drinks beneficial. Emetics: ipecacuanha, tartar emetic. Aconite (*see* Ringer's *Therapeutics*, p. 399). Diaphoretics. Purgatives. Forbid attempts to speak or whisper. If, in spite of treatment, dangerous dyspnoea should come on, perform tracheotomy. For *Œdema glottidis*, *see* next page.

LARYNX, CHRONIC CATARRH OF. CHRONIC LARYNGITIS. CLERGYMAN'S SORE-THROAT.—*Causes*.—Same as those of acute catarrh. But in order to produce the chronic affection they have to be applied in a milder form and more persistently, or repeatedly. To these may be added alcoholism, syphilis, phthisis, and occupations in which the voice is frequently strained. Also a low tone of the nervous and vascular sys-

tems. Damp, cold climates. Herpetic diathesis. *Symptoms*.—Hoarseness; weakness of voice; voice also loses its firmness and becomes uncertain, especially in the higher notes. Liability to intercurrent attacks of acute laryngeal catarrh. Catarrh usually affects also the neighbouring mucous tract of the pharynx. Direct observation of the pharynx with the unassisted eye, and of the larynx with the laryngoscope, shows the mucous glands enlarged, a dusky, congested mucous membrane, small varicose veins, and a glairy mucous secretion clinging to parts of the region. A troublesome, tickling cough sometimes. Almost always a habit of clearing, or rather of attempting to clear, the throat by hawking. Thirst. Frequently a hypochondriacal state which exaggerates the subjective symptoms. Often symptoms pointing to the cause of the chronic laryngitis—*e.g.* signs of alcoholism. *Pathology*.—Inflammatory congestion and eventually thickening of the submucous tissue. Hypertrophy of the mucous glands. A glairy mucous or muco-purulent secretion clinging to the mucous membrane. Rarely ulceration unless the disease has a specific cause. Varicosities of the small vessels. *Diagnosis*.—Compare symptoms with those of specific diseases of, and with those of ulcers, and of growths in larynx. *Prognosis*.—Only good when the causes can be removed or a change of climate can be obtained, or local treatment persistently carried out for a long period by skilled hands. *Treatment*.—Rest from irregular or much speaking or singing. All the ordinary precautions against catarrh, *viz.* : good thick boots, warm dry clothes, dry lodging, dry climate if possible. Exercise in fresh air without thick covering on throat, but merely a thin tie or handkerchief. Regular habits. Avoid night air. Open bowels. Moderate diet. No stimulants. In a few cases generous diet is beneficial. Gargling with hot (not lukewarm) saline solutions, especially of chlorate of potash; sponging pharynx and glottis with sol. argent. nit. (gr. xx.— $\frac{3}{2}$ j.). Inhalations of medicated sprays (especially argent. nit. gr. j.—x. to $\frac{3}{2}$ j.), or of chloride of ammonium vapour. Painting pharynx with glycerine of tannic acid. The health of the other organs and systems of the body should always be inquired into carefully and attended to. Chloride of ammo-

nium, belladonna, mercury, sulphur, ipecacuanha, antimony, iodide of potassium, hazeline, are all sometimes beneficial.

ŒDEMA GLOTTIDIS.—*Causes.*—Usually some ulceration or deeper affection of the larynx than mere non-specific catarrh—e.g. syphilitic disease of the cartilages, small-pox. Sometimes erysipelas spreading inwards from face. Scalds. The œdema often supervenes quite suddenly in the course of such diseases.

Signs.—Firstly, there are the symptoms of the original disease—e.g., hoarseness, loss of voice, cough; then gradually or quickly, signifying the occurrence of 'œdema,' there appears great dyspnoea, almost entirely inspiratory. This assumes a fearful form; and the patient's attitude and expression, as he exerts every muscle to get breath and avoid the strangulation which appears to him imminent, are never to be forgotten.

Diagnosis.—From croup. The latter occurs in children, but œdema glottidis almost always in adults. On pushing the finger boldly into the pharynx, and feeling behind the back of the tongue, the epiglottis and aryteno-epiglottidean folds may be felt, the former as a median pear-shaped swelling, and the latter as two lateral elastic swollen rolls of distended membrane. In the cases where the œdema is unilateral, of course a swelling will only be felt on one side. The swollen epiglottis is sometimes visible.

Pathology.—The œdema results from what is called collateral fluxion, that is, from the active congestion which is apt to take place near a centre of inflammation, especially an ulcer. Niemeyer aptly draws attention to its analogy with œdema of the prepuce complicating a chancre. The swellings may be pale or red, according to whether effusion or hyperæmia predominates.

Treatment.—Scarify with a bistoury wrapped round all but the point by lint or strapping. If the case is not urgent, croton oil may be given; and an emetic when there are many moist râles indicating bronchial and pulmonary congestion. Warmth to the extremities. Patient should swallow slowly small bits of ice. Subcutaneous injection of a solution of pilocarpine has been recommended. Whether the symptoms are urgent or not, they should be carefully watched and surgical assistance be at hand; for tracheotomy may be required very suddenly to save from

instant suffocation. When the above plan of treatment does not arrest the disease, perform tracheotomy. The prognosis after operation is hopeful. (See also TREATMENT OF ACUTE LARYNGITIS.)

LARYNX, SYPHILITIC AFFECTIONS OF.—*Varieties*—(A) Secondary affections ; erythema, condylomata, ulcers ; (B) tertiary affections : 'papulo-tubercular elevations,' ulcers, gummata, perichondritis, necrosis of cartilages. Secondary affections may be suspected from the altered voice, combined with secondary eruptions elsewhere, especially in the fauces. They can be seen with the aid of the laryngoscope and require ordinary constitutional anti-syphilitic *treatment*, aided, in some cases, by such local treatment as inhalations of calomel vapour, sprays of chloride of ammonium and corrosive sublimate, or applications of nitrate of silver. Fatigue of the voice should be avoided. Tertiary affections of the larynx are more destructive and dangerous. The papulo-tubercles affect any part of the laryngeal mucous membrane, and though occasionally causing dyspnoea, chiefly signify their presence by affecting the voice.

TERTIARY ULCERS of the larynx begin either superficially, or from softened gummata, or from perichondritis. Usually multiple ; generally first attack epiglottis. Spread in any or every direction, destroy vocal cords, necrose cartilages. Cause dangerous and suffocative spasms. *Symptoms*.—Hoarseness or loss of voice ; in many cases attacks of dyspnoea : coincident syphilitic history and, usually, syphilitic appearance. Swallowing sometimes difficult from tendency of fluids to pass through glottis. *Prognosis*.—In favourable cases, cicatrisation takes place ; but, even then, voice remains impaired, and a stricture of larynx may result, seriously impeding respiration. So long as disease is active there is great danger of sudden and fatal spasm. *Diagnosis* has to be made chiefly from phthisis and epithelioma. *Treatment*.—Where there is dyspnoea which cannot be rapidly removed by milder means, it is dangerous to delay laryngotomy or tracheotomy. Usually the former operation is to be preferred. Iodide of potassium (gr. x. to xx. *ter die*) must be given ; cod-liver oil, tonics, best hygienic conditions which can be obtained, are indicated. Locally, astringent,

stimulant, and mercurial applications may be made with the aid of the laryngoscope. Laryngeal strictures have been treated by the passage of metallic and vulcanite instruments (Trendelenburg and Schrötter).

TERTIARY ULCER.	PHTHISICAL ULCERATION.	EPITHELIOMA.
1. Attacks epiglottis first	Attacks first near arytenoid cartilages	Usually commences over pharyngeal aspect of arytenoids.
2. Progresses rapidly	Does not advance rapidly	Progress slow.
3. Little thickening	Great thickening	Irregular thickening.
4.	Granular appearance of posterior surface of epiglottis	
5. Expectoration thick, tenacious, yellowish	Expectoration, frothy, thin, muco-purulent, contains bacilli.	At first thin, often bloody.

LARYNGEAL PHthisis.—*Vide* medical works or special treatises. More common than is generally supposed, especially in cases of pulmonary phthisis approaching a fatal termination; attacks one-third of such cases. The diagnosis mainly rests on the co-existence of pulmonary disease and of hectic fever, on the absence of specific disease, such as syphilis, and on the laryngoscopic appearances. The latter may show ulcerations, especially at the back of the epiglottis and near the arytenoid cartilages. The disease is tuberculous; and it may be the result of local infection by phthisical sputa passing over laryngeal mucous membrane. Treatment is addressed both to the ulcerations and *chronic laryngeal catarrh* (*vide* above), and to the phthisis. Also lactic acid locally.

LARYNX, CANCER OF.—Affects chiefly male sex, and almost always occurs in late middle life. Begins usually on left side. Primary cancer is about as often encephaloid as epithelioma, seldom or never scirrhus. The *diagnosis* has to be made from laryngeal phthisis and from syphilis. Phthisis causes earlier and more complete loss of voice. Before there is much evident new growth it is next to impossible to distinguish laryngeal cancer from syphilis. There are symptoms analogous to those of cancer elsewhere, viz. : pain, offensive odour, haemorrhages, glandular enlargements. *Treatment.*—While the diagnosis is at all doubtful give anti-syphilitic remedies. Afterwards, morphia subcutaneously for pain, carbolic acid inhalations for

fœtor, atomised solutions of tannin for haemorrhages. But above all, tracheotomy, which, in Fauvel's cases, prolonged life, on the average, two years in epithelioma and nine months in encephaloid.

The larynx has now been *excised* more than a hundred times. P. H. Watson operated first. Then Czerny's experiments on dogs led Billroth to take the subject up. Many other surgeons have followed, including Foulis, Macleiver, Pick, Whitehead, and Thomas Jones. And, at least in the case of epithelioma, there can be no doubt but that, in suitable cases, the operation is justifiable.¹

LARYNGEAL CARTILAGES, PERICHONDRTIS AND NECROSIS OF.
Causes.—‘Catching cold,’ syphilis, exanthemata. Indirectly, any cause of laryngeal ulceration; for perichondritis may supervene on ulcer of larynx. Patients are usually in a cachectic state. *Signs, &c.*—First those of inflammation: pain very great. Then suppuration: collection of pus may cause intense dyspnoea. Lastly, necrosis of cartilage, which varies from very trifling extent to the loss of whole cartilages. Portions of cartilage are coughed up. Sinuses may form in neck. Cricoid cartilage most frequently affected. The immediate cause of the necrosis is usually separation of inflamed perichondrium rather than inflammation of cartilage itself. *Diagnosis.*—Easy when necrosis, with abscess or sinus, is fully advanced. But earlier stages are accompanied by signs of laryngeal irritation, which may resemble those caused by a foreign body. Use laryngoscope and consider history of case. *Treatment.*—On general principles. Open abscess. Perform tracheotomy if dyspnoea is urgent and dangerous. Treat syphilis if present.

LARYNX, INNOCENT TUMOURS OF.—*Varieties.*—Fibrous and fibro-sarcomatous polypi, adenomata, papillomata, mucous cysts. Fibrous polypi and papillomata are the most common. Other varieties, such as lipomata, occur with extreme rarity. Cancerous tumours are noticed elsewhere. *Position.*—Very rarely on the posterior wall (where ulcers are very frequent). *Signs.*—Dyspnoea when tumour is large enough or so situated as to

¹ For an exhaustive memoir on the subject by Baratoux, abstracted and translated by P. S. Abraham, see *Annals of Surgery*, 1885, vol. ii. p. 397.

be liable to get between the vocal cords. When the tumour is above the glottis inspiration is most likely to be obstructed, when below the glottis the dyspnoea may be expiratory. Sensation as if foreign body were in larynx. Sometimes secondary laryngeal catarrh: cough, hoarseness, aphonia. *Diagnosis.*—Use laryngoscope. *Treatment.*—Removal through the mouth, in most cases. Sometimes the larynx has to be opened from the neck, by median division of the thyroid cartilage, for instance. In removing through the mouth, snares, écraseurs, laryngeal forceps, guillotines, and even galvanic cautery are used. Of course the parts have to be made visible by laryngoscope during operation, and no small skill is usually required. *See* special notice of LARYNGOSCOPY. Puncture cysts. Tracheotomy is done prior to thyrotomy, and may be required in case of severe dyspnoea from tumour, merely to avert immediate danger to life.

LARYNX (TRACHEA OR BRONCHI), FOREIGN BODIES IN.—*How they gain entrance.*—Through glottis, or, very rarely, through a wound. Children most liable, from practice of playing with things in their mouths. Laughing or coughing whilst swallowing: the deep inspirations taken in those actions suddenly draw food into the air-passages. Syphilitic ulceration may impair laryngeal orifice or sphincters. General palsy of the muscles which close the glottis. Palsy of the vocal cords is not in itself enough to cause any danger of entrance to foreign body. *Parts where they lodge.*—Sharp bodies usually stick in larynx, especially in or near the ventricle, or just above the glottis. Of course, only bodies of limited size can pass through glottis. Small, smooth, rounded bodies most likely to drop into trachea or bronchi, especially into right bronchus. Septum between bronchi is to left of middle line. Right bronchus is larger than left. *Signs.*—Depend (1) upon size of body, (2) upon its position, (3) upon whether it is impacted or not, (4) upon its nature, whether sharp and jagged or smooth and rounded. 1. A sufficiently large substance will cause speedy suffocation, unless removed. 2. Bodies near the glottis usually cause acute irritation, spasm, cough and choking sensation: perhaps haemorrhage and pain. Symptoms may be aggravated by each act of swallowing.

If not removed, ulceration, catarrh, or even abscess will ensue. Impaction in the trachea causes signs mainly of impeded respiration, but also produces general laryngo-tracheal irritation, and eventually, inflammation and ulceration. The interference with respiration, as well as the tracheitis, soon affects the lungs. Bronchitis and pneumonia. When a bronchus is the locality, the signs resemble those of foreign body in the trachea ; but the pulmonary symptoms are confined to or most marked in one lung. There is decrease or absence of respiratory murmur on the affected side. 3. Bodies lying loose in the air-passages are apt, as they from time to time come in contact with the glottis, to cause sudden and violent paroxysms of choking and dyspnoea. 4. Of course, sharp and jagged bodies produce greater irritation, and cause far greater danger of ulceration, &c., than smooth ones. *Diagnosis.*—The history generally makes this clear. Laryngoscope is very valuable. Lay stress upon the sudden access of the symptoms without warning, and on the absence of fever. Of course, when inflammation has resulted fever will be present. *Prognosis.*—Most grave, unless the body can be removed. The instances in which substances have remained without producing serious consequences are very rare. Sooner or later disease of the lungs ensues and proves fatal. *Treatment.*—Measures must be taken to remove the foreign body. In some cases the finger suffices to hook away an obstruction partly within and partly without the larynx. In adults, the laryngoscope will sometimes enable forceps, hooks, or loops to be used successfully; and, in children, inversion of the body (applied by Mr. Brunel to himself), should be tried, aided by succussion and by slapping the back. The remaining proceeding is tracheotomy or laryngo-tracheotomy. And, when employing inversion, succussion, &c., the surgeon should always be prepared to do tracheotomy at a moment's notice. If the foreign body is in the trachea or bronchi, do tracheotomy low down. If the foreign body be in the larynx, and cannot otherwise be extracted, the tracheal wound may be extended upwards, even through the thyroid cartilage itself. If, when the wound has been made, extraction cannot, even with the help of inversion and succussion, be effected, the wound must be kept open

in the hope that the patient may shortly cough out the body. And a cannula must not be worn unless the foreign body is known to be above the wound.

LARYNX, STENOSIS OF.—Usually due to cicatricial contraction or to edematous swellings of inflammatory (simple or specific) diseases. Excellent results from dilatation by daily use of Schrötter's rubber tubes. *See Koch (of Luxemburg), and Hering, Trans. Intern. Med. Congress, 1881.*

RULES FOR LARYNGOSCOPY.¹—1. *Position of patient*: sitting, body and head erect, knees together, head slightly thrown back. 2. *Lamp*: in line with patient's ear, nine inches to left of his head. 3. *Position of surgeon*: opposite patient with mirror properly adjusted to head and eye. 4. *Mouth*: wide open. 5. Reflect light upon fauces at correct focal distance of reflector. 6. Warm laryngeal mirror over lamp. Test it against cheek or hand. 7. Direct patient to protrude his tongue. 8. Hold it between thumb and index-finger, in napkin (thumb uppermost). 9. Hold laryngeal mirror like a pen. 10. Place its back gently against uvula. 11. Move your hand slightly towards patient's left, so as to keep it out of line of view. 12. Patient to draw a deep breath, and say 'ah,' 'ur,' 'eh,' or 'ee.' Be always quiet and gentle; encourage the patient; let each examination be short, even if unsuccessful. Be careful not to hurt patient's tongue, or to burn his mouth, or to push either his uvula or the mirror against the back of the pharynx. Use of cocaine to lessen sensitiveness of fauces.

LARYNGOTOMY.—Steady larynx between thumb and forefinger of left hand. Make a perpendicular incision through skin and fascia over crico-thyroid membrane, and one inch long. Pass a sharp scalpel through crico-thyroid membrane transversely. In the absence of a cannula (*e.g.* in operations done with a penknife to prevent choking), turn the blade on edge to hold open the wound. In operations done deliberately, of course some tube must be introduced. *See TRACHEOTOMY.* Tie any bleeding vessel as soon as it is divided.

Macewen has (in *Brit. Med. Journ.* for July 24 and 31, 1880) demonstrated that tracheal tubes introduced through

¹ Abbreviated from Lennox Browne.

the mouth may be used as a substitute for tracheotomy or laryngotomy in cases both of disease and of operation.

Ligaments. *See Joints.*

Lips are liable to congenital deformities (*vide HARE-LIP*), to fissures, chancres, epitheliomata, cysts, nævi, wounds, carbuncles, &c. *See* general articles, *e.g.* TUMOUR, CYSTIC, &c.

FISSURE OF LIP.—Often syphilitic. Touch with argent. nit.; afterwards use weak ungu. hyd. nit., cold cream, &c. Antisyphilitic remedies if necessary. Make a shallow cut through base in obstinate cases.

CARBUNCLE OF LIP is singularly dangerous. *See* CARBUNCLE.

Lithotomy.—*Definition.*—An operation in which the bladder is cut into for the extraction of a calculus. *Varieties.*—Two kinds, viz. supra-pubic and perineal (vaginal in the female). Varieties of perineal lithotomy, viz. (1) lateral, (2) median, (3) bilateral, (4) medio-lateral. Bilateral lithotomy is so rarely employed that we must refer to larger works for a description of it.

LATERAL LITHOTOMY (by far the commonest operation).—*Instruments.*—‘Staff,’ grooved on side or on convexity, lithotomy knife, lithotomy forceps, scoop, bandages or straps to fix ankles and wrists, large syringe, sponges, towels, catheter and iodoform gauze for plugging wound if it should be required. Stool or low chair for operator. Pocket-case; anæsthesia; razor and soap to shave perinæum. Patient should be warmly clad, and his rectum empty. Bladder, if empty, should be injected. Operation: place patient in lithotomy position, bandaged or strapped (or the legs may be held in position by two assistants). Buttocks to be well over end of table. The stone should be detected whilst the patient is on the table, or else the operation should be postponed. The surgeon sits at a convenient height, with his instruments on a table close by, and an assistant to hand them (the latter should be instructed as to the size and kind of forceps required, &c.) The surgeon passes the staff, and gives its handle to an assistant on the patient’s left. This assistant keeps the handle of the staff perpendicular, grasping it firmly, but with the thumb upright. He should keep the concavity of the staff pressed up against the symphysis pubis. Surgeon now incises skin and

fat from a point in median raphé one inch and a half in front of anus, outwards and backwards, to midway between anus and tuberosity of ischium. Incision may be extended backwards in ischio-rectal region if necessary. Deepen incision until the groove in the staff can be felt with the tip of the left forefinger. Using the same finger and its nail as a guide, send the point of the knife into the groove in the staff—of course opening the urethra. Next glide the knife along the groove till it reaches the bladder. The passage of the knife into the bladder is recognised by the disappearance of the sense of resistance which is felt when the prostate is being cut, and perhaps, also, by the escape of urine. As the knife glides along the groove, its handle should be depressed, so that the point of the knife may *never leave the groove till it fairly enters the bladder*. A neglect of this precaution may result in the knife getting between the bladder and the rectum. Withdraw the knife, 'lateralising' it and deepening the incision in the prostate during withdrawal. In case of a large stone, knife may, during withdrawal, be moved out of groove of staff a little to deepen incision. Insinuate left forefinger into bladder, and, as soon as you are *perfectly sure* that your finger is in the bladder, withdraw the staff, *but not before*. Take the forceps with your right hand and pass them into bladder, along dorsum of left index finger. When they have reached bladder open them, and, very likely, the gush of urine which usually now takes place will wash the stone into the grasp of the forceps. If this should not happen, care must be taken in seizing the calculus not to include any vesical mucous membrane, and the calculus should be so grasped that its long diameter may be in a line with the axis of the forceps. In extracting stone, forceps should be pulled in a downward and backward direction, and with a twisting movement. When wound is very deep, blunt gorget may guide forceps into bladder better than index-finger. When calculus is large, finger may be used to dilate incision of prostate and neck of bladder, or a blunt-pointed bistoury may be used to deepen prostatic incision. Sometimes stone can be more easily extracted between forefinger and scoop than by forceps or by finger alone. If stone breaks up,

use of scoop and of syringe will be required. If stone is very large, surgeon may have to purposely break it with a strong lithotrite, and extract it piecemeal. When the last-mentioned proceeding has to be resorted to, the prognosis is not very hopeful, not so much from the measure itself as from the state of things for which it has been required. It may be preferable to open the bladder above the pubes. The bladder is now carefully explored for another calculus or for *débris*. In case of haemorrhage, use a plug made like an umbrella, *i.e.* a piece of catheter with asepticised lint or linen tied round it towards one end. This end is passed into bladder, and lint or wadding pushed into the wound between the lint and the catheter. The whole can afterwards be withdrawn by pulling at the lint. Instead of this contrivance, Sir H. Thompson recommends Buxton Browne's dilating india-rubber bag. Tie the legs together, and send patient back to bed. The dangers and accidents of lithotomy are (1) haemorrhage, (2) wounding rectum, (3) missing the bladder with the knife, (4) leaving a calculus or piece of calculus in bladder, (5) pelvic cellulitis, (6) peritonitis, (7) cystitis, (8) erysipelas, pyæmia, and other accidents common to wounds in general. Any of the above complications may be fatal. But the great *cause of death* after lithotomy is pre-existing *kidney-disease*. *After-treatment*.—Merely rest, warmth, cleanliness, and careful observation. Oil buttocks and thighs while urine continues to flow through wound.

MEDIAN LITHOTOMY.—1, pass a grooved staff into bladder ; 2, place left forefinger in rectum ; 3, feel with the same finger for the apex of the prostate ; 4, enter a straight knife half an inch in front of anus and direct its point to the urethra, just in front of apex of prostate ; 5, with this knife cut upwards a little, dividing small portion of urethra ; 6, pass a probe-pointed director into the bladder, and withdraw the staff ; 7, gently insinuate finger along this director and dilate (or tear ?) prostate with the finger ; but use the knife again rather than violence with the finger ; 8, extract the stone with forceps. This operation is adapted for extraction of foreign bodies.

Several operators, including Buchanan and Teevan, use a

rectangular staff when performing lithotomy. At Guy's a 'straight' staff is used. N. R. Smith's ingenious apparatus is figured in Erichsen's *Surgery*, 7th ed. p. 778.

SUPRA-PUBIC LITHOTOMY, or 'high' operation.—The rapid advance in popularity of this operation is due to the observations of Garson on the effect on the position of the ante-vesical peritoneal fold, of dilating the rectum. Surgeons are far from agreed upon the indications for this operation. It may be safely recommended when the stone is (1) very large, (2) very hard, (3) in a pouch ; and also (4) for foreign bodies of a certain size and strength. There is danger of urinary infiltration, of septic infection and even of injury to the rectum by the distending bag ; but probably all these could be successfully guarded against. In the after-treatment, keep the patient on his side as recommended by Trendelenburg, with hips high (foot of bed raised) ; and use iodoform gauze freely to wound.—Instruments : scalpel, artery-forceps, dissecting-forceps, curved staff, or metal catheter, retractors, lithotomy-forceps.¹ Insert rectal bag and fill it gently with about 8 ounces of fluid. Inject bladder with warm, weak boracic lotion until it can be felt as a distinct, but not dangerously distended tumour between the pubes and umbilicus. 2. Incise skin in middle line from pubes upwards, for three inches. 3. Dissect carefully downwards and backwards using scissors or the knife-handle, preferably to its blade, to reach bladder, pushing away the peritoneum if necessary, and keeping near the pubes. 4. Fix the bladder with a sharp hook and open it with scalpel or scissors. 5. Enlarge incision in bladder towards its neck. 6. Drainage through wound usual, but more than once the lithotomy wound has been closed immediately. The suturing must then be very thorough, in buried layers. Extract with lithotomy-forceps. The supra-pubic operation should be done antiseptically.

Annandale, when performing supra-pubic lithotomy on children, first seizes the stone with a lithotrite, and then depressing the handle of the latter cuts down upon the stone between its blades.¹

¹ *Brit. Med. Journ.*, Jan. 2, 1886.

Lithotry.—Operation by which a calculus is crushed in the bladder and the fragments afterwards extracted through the urethra.¹ *Circumstances under which suitable.*—When (1) age is 15 or upwards ; but, mainly owing to the experience of Keegan, it is becoming fashionable to crush calculi even in children. (2) stone is less than one inch in diameter (if the other conditions are favourable this limit may be considerably exceeded), (3) it is of soft or friable material, *e.g.* phosphates, (4) urethra is healthy, (5) bladder and kidneys are healthy, (6) prostate is normal. A combination of the above conditions should make success certain. Noticing each individually, it may be observed that lithotomy is safer when the bladder and kidneys are diseased and the stone very large or the stones numerous, when the urethra is narrowed by a stricture and the bladder at the same time not very healthy, and when the prostate is so enlarged as to make manipulation of the lithotrite or removal of the fragments difficult. But there are many cases in which the reasons for or against lithotomy or lithotry are very nicely balanced. The main considerations are, undoubtedly, age of patient and health of genito-urinary organs. A practised lithotritist is justified in crushing where a less experienced surgeon ought to cut. It has been proved against lithotry that it is often followed by relapse, and alleged against it, that, when performed on boys, it frequently causes impotence.

Operation.—Instruments : lithotrite, Clover's syringe, linen cloth on which to wipe lithotrite, oil, basin of water to receive fragments, warm water to inject if required.

Preparation.—Rest and treatment of vesical irritability, if present, for a short time before day of operation. Bowels to be cleared. Bladder should contain four or five ounces of urine or warm water. Recumbent position. Pillow beneath buttocks. Blankets to keep trunk warm. Anaesthesia by ether. Warm and oil lithotrite and pass it well into bladder. Be extremely gentle throughout sitting. Seize stone by one of two methods : 1 (Civiale's). In this the calculus is picked up by the litho-

¹ Professor Dolbeau's 'Perineal Lithotry' is outside the above definition. His operation is really a combination of lithotry and lithotomy.

trite, just as a bird picks up a pebble with his beak. The following rules are usually followed :—I. In the case of small or medium-sized stone (1) pass the lithotrite, closed, to the back of the bladder ; (2) if the lithotrite has touched or is touching the stone, rotate it slightly away from the stone and withdraw the male blade ; rotate it back again to a little beyond its original vertical position, and close the blades. The stone will probably be caught ; (3) in any other case proceed to find and seize the calculus systematically, thus : 1, withdraw the male blade, then half-rotate (45°) the lithotrite to the right, thus \diagup , and close ; 2, withdraw the male blade again, then half-rotate to the left, \diagdown , and close ; 3, rotate (90°) to the left horizontal, and close ; 4, rotate to the right horizontal. In each case withdraw male blade before rotation, and also depress handle of lithotrite half an inch, so as to slightly tilt up its blades ; 5, 6, search the sides of the floor of the bladder by a still further rotation (135°), first to right, then to left. Before doing this depress handle of lithotrite one inch and a half ; 7, having opened the blades, turn them to the inverted perpendicular and close, at same time depressing handle still further. In this way the lithotrite searches all round its own axis at intervals of 45° , and cannot well miss anything. Every movement is to be conducted with extreme gentleness, and, in particular, the centre of motion, when the instrument is moved at all, should be the prostatic part of the urethra, where serious results would be most likely to follow injury inflicted by rough manipulation. Small stones usually lie towards the back of the trigone.—II. In the case of a large stone, rotate away the blades to open them, as in the cases previously noticed ; but do not open the lithotrite by pulling back the male blade ; open it by pushing forward the female blade, leaving the male at the neck of the bladder ; then rotate towards the stone and seize. 2, *English mode of seizing stone.*—The handle of the lithotrite is raised so as to depress its blades against the base of the bladder. The male blade is then withdrawn, the handle being simultaneously raised a little more. If the calculus does not then fall between the blades, tap the lithotrite lightly in front or on one side, so as

to try by the slight concussion to dislodge the calculus. This failing, the blades may be rotated slightly, first to one side, and then, if necessary, to the other.

The stone being seized, rotate the lithotrite a fourth of a turn on its axis before crushing, so as to find if any mucous membrane has been accidentally trapped. Work always as near the middle of the bladder as possible, and always over the same spot. On this spot the fragments will fall, and from it they can be picked up and further crushed, if necessary. The old rule was that no sitting should last more than five minutes. But Professor Bigelow, considering that the practice of leaving sharp fragments in the bladder for weeks was more hurtful than the prolonged use of the lithotrite, evacuating catheter, and bottle ; being struck, moreover, by Otis's emphatic announcements of the great calibre of the urethra—developed the operation of lithotripsy, with immediate extraction of the fragments from the bladder, *litholapaxy*, as he called it. He uses a special lithotrite, an evacuating catheter of a size, if possible of No. 30 (French), and an aspirating syphon, which stands on a table and communicates with the evacuating catheter by an india-rubber tube. Ether is given, and the sitting may be prolonged for an hour. There are many details to be attended to. *Vide* a paper by Bigelow in *Clin. Soc. Trans.* vol. xii. 1879. See also observations by Sir H. Thompson and Mr. Cadge at the meeting of the British Medical Association, Cambridge, 1880. It is now the recognised practice to crush the stone and empty the bladder at one sitting. Crush the calculus by a series of short sharp turns of the screw. When removing lithotrite always previously see that the male blade is pushed home, and that there is no fragment separating it from the female. Finally, before pronouncing the case complete, a most careful exploration of the bladder should be made with a small lithotrite, lest a single fragment should remain to form the nucleus of a new stone. The diet should be rather low, the drinks demulcent and copious, the clothing warm. Morphia suppositories may be useful.

Accidents and Complications of Lithotripsy.—1, impaction of fragments in urethra or in neck of bladder ; 2, retention of

urine ; 3, cystitis ; 4, renal irritation, and even suppression of urine ; 5, orchitis ; 6, abscess in prostate ; 7, inflammation of veins around neck of bladder ; 8, pyæmia ; 9thly, may be added effects of culpable clumsiness in operating *e.g.* laceration of the urethra or bladder. Impaction of fragments in urethra demands instant treatment. If it occurs near bladder, endeavour to push back fragment with large catheter. If it is nearer the meatus, attempt to extract it with Civiale's urethral scoop, using the greatest care and gentleness. It may be necessary to open the urethra from without. Retention of urine is usually only temporary, and yields to warmth and liq. opii. Cystitis may only be an aggravation of a condition existing before the operation, or it may be due to sharp fragments, or to the atony of the bladder, which in old people may prevent the expulsion of the fragments. It must be treated on general principles, one of which will be to remove the cause. The application of this principle may demand the use of the lithotomy scoop or of Clover's or of Bigelow's syringe, or even the performance of median lithotomy to remove irritating fragments accidentally left. Renal irritation demands cupping to the loins, warmth, purges, &c.

Liver, Rupture of. *Vide ABDOMEN.*

Liver, Surgery of.—At present in a vigorous infancy. Cysts and abscesses have been on many occasions incised, washed out, drained, and the edges of the opening in the liver sutured closely to the aperture in the abdominal wall. Formerly attempts used to be made to procure adhesion of the liver to the parietal peritoneum before opening the veins. This now appears to be unnecessary, and possibly harmful, as Lawson Tait and Knowsley Thornton have relieved severe symptoms by simply separating old adhesions. Haemorrhage from liver-substance, like that from other parenchymatous organs, is very amenable to sponge pressure. Jaundice said to contra-indicate operation (Lawson Tait). When pleura intervenes it can be dissected up (Thornton) ; but this is not absolutely necessary. Adhesions often exist. Kartullis has successfully drained cases after removing parts of ribs and opening pleura. Free drainage very necessary. Aspiration of

contents of cysts previous to incision, helps to prevent extravasation into peritoneal cavity.¹ This will frequently, if not generally, suffice to cure hydatids ; but it occasionally causes sudden death (attributed by Lawrence Humphry and Roy to poisoning by absorption of hydatid fluid through the peritoneum or a wound in some vein). When hepatic abscess points, it should be opened and drained according to general surgical principles. (See *Annals of Surgery*, Oct. 1886, and March, 1887.)

Lungs. See CHEST, INJURIES OF.

Lupus. See ULCERS, and TUBERCLE.

Lymphangitis and Lymphadenitis.—Inflammation of the lymphatics and their glands. Like other inflammations it may be acute, sub-acute, or chronic. Most of the differences between these three forms are such as are analogous to their differences in inflammations of other superficial parts. *Causes.*—Almost always, especially in the case of acute and sub-acute forms, absorption of inflammatory or septic material from a wound or pustule, or fissure or sore. According to Paget, the poison or irritant, at all events in the instance of post-mortem virus, may be absorbed through unbroken skin. Chronic glandular inflammation and enlargements are scarcely distinguishable from strumous glands on the one hand, and from lymphoma on the other ; they will, therefore, not be further noticed here.

Anatomy.—Vicinity of lymphatics and glands is the seat of hyperæmia and plastic infiltration. This often leads in parts to local (rarely diffused) abscesses, including even deposits of pus in the lymphatics themselves. The process usually ceases at the first glands on the upward course of the lymphatics affected. The glands themselves become congested, swollen by serous effusion, and crowded to obstruction with corpuscles. The main *terminations* of lymphangitis are three : (1) resolution, (2) suppuration, almost always with satisfactory recovery, (3) pyæmia, and then usually death. Not unfrequently cases of dissecting wound with lymphangitis and abscesses in the track of the lymphatics affected are wrongly spoken of as

¹ See debate at meeting of British Medical Association, Brighton, August, 1886.

pyæmia. If such cases were true pyæmia, recovery in them would scarcely be so frequent as it is. The cellular thickening caused by lymphangitis and adenitis is often very persistent, and the small erysipelatous patches may enlarge vastly. *Signs.*—Track of inflamed lymphatics marked by red lines, or red band, or by mere thickening and hardening of the lymphatic cord. Often oedema in the neighbourhood, or even of the whole region or limb. Pain, tenderness, stiffness. In certain places frequently patches of superficial cutaneous redness. Where suppuration occurs, there is softening, easily detected by drawing the tip of the forefinger lightly over the part. The amount of fever and gastric disturbances varies from *nil* to the highest grade. Usually a sudden rise of temperature, even to 104–5°. In the course of any wound, rigors or such a temperature usually signify local lymphangitis. *Diagnosis*—From phlebitis. Course of veins and of lymphatics not anatomically identical. No glands on the veins. Inflamed veins are 'knotty.' *Prognosis.*—Usually in all respects good ; but in the case of large operation wounds, compound fractures, and the like, signs of lymphangitis require very prompt attention ; and there are certain forms of blood-poisoning which first manifest themselves by lymphatic inflammation, and which are singularly fatal. The fatality of such cases is usually due more immediately to pyæmia, phlebitis, thrombosis, and embolism ; while its remote cause is often either the intense septic malignancy of the absorbed poison, or perhaps local anatomical peculiarity, e.g. proximity to cerebral sinuses. *Treatment.*—Rest, general and local ; elevation, fomentations, poultices, pressure. Pressure, to succeed, should be very skilfully and gently applied. Equal parts of extractum belladonnæ and glycerine, or cotton-wool, may be bandaged upon inflamed glands. Puncture as soon as softening is distinct. Mercurial ointment, iodine paint, pressure, and massage for persistent thickenings. Attend to general symptoms. Calomel and salines often valuable. Sulphide of calcium. As a rule prefer low diet.

Lymphatics and Lymphatic Glands.—Both are liable to inflammation, to wounds, to hypertrophy, and to cancer. The former are also subject to varix. See *Lymphangitis*, &c.

WOUNDS OF LYMPHATICS almost invariably close by spontaneous coagulation of lymph. Lymphatic discharging sinuses are very rare. *Treatment.*—Pressure.

VARIX OF LYMPHATICS.—Very rare. *Treatment.*—Pressure.

Lymphoma. *See* TUMOURS.

Macroglossia. *See* TONGUE.

Macrostoma.—Congenital enlargement of the mouth, consisting, so to speak, of extension of one angle outwards. Sometimes associated with 'auricular appendages.' See Morgan, *Med.-Chir. Trans.* 1882, and Fergusson's *Practical Surgery*.

Malignant Pustule. *See* ANTHRAX.

Meningocele.—A congenital hernia of the membranes of the brain. When such a tumour contains brain, it is termed an *encephalocele*. *Cause.*—Probably a combination of imperfect development of the skull-wall with a tendency to hydrocephalus. *Signs.*—A tumour situated in the line of one of the sutures, usually in the median line and towards the occiput. Sometimes at the root of the nose, or even in the pharynx. Occasionally there is a peduncle. Bluish, or colour of natural skin, transparent, pulsating with the brain and with respiration. Sometimes compression of it will cause convulsions. More or less marked hydrocephalus almost always coincident. *Prognosis.*—Almost hopeless as to ultimate recovery. A small, pedunculated tumour without symptoms of hydrocephalus would give the most hope. *Diagnosis* from nævus or from congenital cysts may be difficult. 'The diagnosis' of meningoceles and encephaloceles 'rests first upon their congenital occurrence and position at one of the membranous portions of the foetal head ; next, upon their fluid nature ; thirdly, upon their considerable and decided increase in volume or tension, with strong expiratory efforts ; fourthly, upon their reducibility in part or entirely ; and fifthly, upon their sharing in the motions of the brain.' (Holmes, in his *System of Surgery*, vol. v. p. 968.) *Treatment.*—Support carefully and gently with a smooth soft pad and bandage. Puncture justifiable when increase is continuous. Injection of iodine has been tried with doubtful success.

Annandale ligatured and excised successfully in a somewhat exceptional case.

Microscopic Organisms (Vegetable).—Table of the chief diseases in which they have been found :—

DISEASE.	ORGANISM.
Favus.	Achorion Schönleinii.
Tinea tonsurans.	Trichophyton tonsurans.
Sycosis.	Microsporon mentagrophytes.
Pityriasis versicolor.	Microsporon furfurans.
Thrush.	Oidium albicans.
Concretions in the mouth, salivary ducts, and urinary bladder (including all carbonate of lime calculi).	Leptothrix (a bacillus).
Caries of the teeth.	Ditto.
Acute abscesses.	Cocco-bacteria.
Malignant pustule. Anthrax (of animals).	Bacillus anthracis.
Glanders.	Bacillus.
Meat-poisoning.	Bacillus (Klein).
Malarious affections.	Bacillus malariae.
Typhoid.	Bacillus typhi abdominalis.
Typhus.	{ Bacillus typhi exanthematici.
Leprosy.	Cocco-bacteria (Mott).
Cholera.	Bacillus leprosus.
Dysentery.	Bacillus cholerae.
The Septic processes :—septicæmia, pyæmia, progressive suppurations, hospital gangrene, diphtheria, puerperal fever.	Cocco-bacteria.
Mycosis septica (Orth.)—a disease of new-born infants.	Cocco-bacteria (genus—‘microsporina’).
Mycosis of the navel.	Cocco-bacteria.
Osteo-myelitis.	Cocco-bacteria.
Meningitis, Cerebral (Leyden).	Ditto.
Cerebro-spinal (Aufrecht).	Ditto.
Acute exanthemata :—variola-vaccina, scarlatina, measles.	Cocco-bacteria (genus—‘monadina’ of Klebs).
Whooping cough.	Cocco-bacteria.
Inflammatory processes :—endocarditis, certain ‘rheumatic’ or ‘fibroid’ affections of the liver and kidney, which ‘lead more especially to formation of connective tissue, and not to suppuration.’	Cocco-bacteria (genus—‘monadina’ of Klebs).
Croupous pneumonia.	Ditto.
Erysipelas.	Ditto.
‘Certain puerperal processes.’	Ditto.
Mumps.	Ditto.

DISEASE.	ORGANISM.
Tuberculosis.	Bacillus.
Syphilis.	Ditto (Klebs and Bireh-Hirschfeld).
Gonorrhœa.	Gonococcus
In the tartar and caries of teeth is found—	Spirochæta (of tartar, &c.)
Relapsing fever.	Spirochæta Obermeieri.

In only a certain number of the above has the organism been clearly demonstrated to be the actual cause of the corresponding disease. This has been done in anthrax, chicken-cholera, erysipelas, glanders, gonorrhœa, relapsing fever, septicæmia of mice, and tuberculosis. But the chain of proofs is manifestly in process of completion with respect to others on the list. The micrococcus of osteo-myelitis is said to be identical with that of furuncle.

METHODS OF STUDYING THESE ORGANISMS.—High power usually required. Many micrococci look small even when magnified 700 diameters. Most, but not all, resist the action of acids and alkalies, while animal tissues do not. Staining fluids : hæmatoxylin and aniline dyes, especially latter. Special illumination apparatus : Abbe's.¹ Examination may be made of either (1) the diseased animal tissues, (2) the soil, water, or air in which some of the organisms unquestionably flourish, (3) cultivation-fluids and solids, or of (4) the tissues of animals artificially inoculated. When cultivation-fluids are used or animals inoculated, the solid microscopic organisms may be separated from the liquid in which they lie. This is done in two ways: (1) Chauveau's, who used the sediment deposited by vaccine; (2) filtration through porous clay (Klebs), or through gypsum (Pasteur). Further, though individual animals have very similar susceptibilities to these organisms, yet different species are often very unequal in this respect. Thus the living animal body can be sometimes used as a filter, to separate even one kind of minute organism from another (Koch), and it is, of course, easy to separate any organism which infects the body generally from one which infects only locally.

By repeated cultivation in solids, *e.g.* gelatine and potato,

¹ Made by Zeiss (London agent,—Baker, of Holborn).

a process which Koch has perfected, not only can organisms be entirely separated from any non-vital matter, septic or otherwise, with which they may be mixed, but different species of organisms can be separated from one another. In the case of some, it is found that, however indistinguishable the individual elements may be under the microscope, the appearance of aggregations—of colonies, so to speak—when cultivated on the potato or on gelatine, is characteristic.

Botanical Position.—The microscopic organisms, not animal, which are found in animal bodies in infective diseases all belong to the sub-class Thallogenæ. In the order hyphomycetæ are achorion, trichophyton, and oïdium. In the order algæ is leptothrix. In the order schizomycetæ may be distinguished two widely different forms, viz., bacilli and cocco-bacteria. The bacilli have been respectively named after the diseases in which they occur. (See above.) Cocco-bacteria (micrococci) are divided again into microsporina and monadina. According to Schenk, Ray Lankester, and others, in the study of some organisms, micrococci have been found to develop into bacilli, and these again into spirilla. But there can scarcely be a doubt that many, if not all, of the organisms in the list given above possess specific distinctive peculiarities.

Morphology.—In bodies so minute there cannot be great variety in shape. The chief forms are delicate rods and granules. The former are sometimes jointed, and the latter are frequently arranged in a chain-like series. When a number of bacilli are joined end to end, a thread-like appearance results. Masses of organisms occur termed zoogloea. The size varies somewhat according to the species. The spirobacteria occur as spiral fibres. The tubercle bacillus has a length, in round numbers, of from $12\frac{1}{600}$ to $7\frac{1}{600}$ of an inch.

Parts they inhabit.—Chiefly the blood-vessels. But those which are the probable causes of purely local diseases are found only locally. The contents and, still more, the walls of abscesses. Ogston says they are always to be found in acute abscesses. Pyæmic deposits. The small metastatic deposits of pyæmia, puerperal fever, &c., consist of bacteria; and the discovery of this (by Rindfleisch) was 'the first communication regarding

the occurrence of bacteria in the organs of those who have died of traumatic infective diseases' (Koch). Granulations. Joint-surfaces. Serous membranes. Diphtheritic exudations. Pus. Renal glomeruli and tubuli. Indeed, every organ or tissue appears to be liable to invasion by some septic organism or another. The monadina are actively movable, and penetrate the cells, causing considerable swelling of them.

HOW DO THE ORGANISMS ENTER THE BODY, AND WHENCE DO THEY COME?—They do not exist normally in the healthy body. The best observers, those who have added most positive information to our knowledge of minute anatomy, have been quite unable to find them herein. The same class are practically unanimous in rejecting the idea of spontaneous generation. Many of the organisms enter seldom or never except through wounds or slight abrasions, scratches, or punctures. Others readily cling to and grow into the cells of mucous membranes. Possibly some may have the power of piercing skin, or at all events the skin of a person not in perfect health. The organisms sometimes pass from one animal to another by contact with secretions or excretions, or in a few instances, perhaps, through the air. Some of the organisms exist constantly in certain localities in the air, the water, or the soil. Some cling to certain buildings, perhaps to the walls, floors, ceilings, or furniture. Almost the whole of this part of the subject requires investigation. Koch's method of detecting organisms in external media, and cultivating them, is thus summarised by Dreschfeld. 'The cultivating fluid is mixed with gelatine (gelatine 5-10 p.c. ; dry peptone 1 p.c. ; chloride of sodium 0.5, a little carbonate of soda and infusion of meat), so as to become solid at ordinary temperature. When air is examined, the gelatine is put in a tube closed, and the air allowed to pass through, and thus the micro-organisms are collected and cultivated. When water is examined, the water is simply run on to the gelatine, and the micro-organisms allowed to cultivate. The same with soil. The cultivated organism can then be easily examined.'

Do the Microscopic Organisms cause the Diseases, or are they merely accidental concomitants, 'parasites of the diseases,' so to

speak?—To answer the first part of this question positively in the affirmative, it would be necessary to demonstrate that, (1) the organisms exist in every case of each disease ; (2) that they exist also in sufficient numbers and in the proper localities to cause the phenomena of the disease ; (3) that when transferred successfully and purely from one animal body to another of the same species they reproduce the disease. Moreover, it would be very desirable to show that the organisms of different diseases have themselves different morphological peculiarities. The difficulties of fulfilling all these requirements are immense ; but they have been overcome in the case of a sufficient number of distinct diseases to encourage hope that ultimate success will attend the investigation of many others. An additional embarrassment for experimentalists seems to have been brought to light by some recent observations on the production of osteomyelitis. It was found that inoculation with the organisms found in this disease produced no effect except when the animal inoculated had one of its bones injured. It should be noticed that Koch, having produced pyæmia in mice, found that the micrococci adhered to the red corpuscles, and that the red corpuscles thus affected tended to crowd together in the capillaries. The ultimate result of this was thrombosis. This, perhaps, explains the occurrence of 'metastatic' abscesses in pyæmia. At least one form of organism, 'granuligera' (Lister), has been shown by Cheyne to frequently grow in wounds treated antiseptically. This is harmless except under peculiar circumstances. See Lister's 'Inaugural Address on Catgut Ligation,' *Clin. Soc. Trans.*, 1881.

Antidotes.—Many substances are fatal to bacteria. Such are corrosive sublimate, carbolic acid, boracic acid, oil of eucalyptus, salicylic acid, and iodoform.¹ The most powerful of these is corrosive sublimate. All these reagents require *time* to act thoroughly. For instance, 1-20 carbolic lotion takes one or two days to destroy anthrax spores. Also much depends on the diluent with which the antiseptic is mixed. Oil tends to make carbolic acid comparatively inert when applied to dry spores.

A temperature of 120° to 160° Fahr. will prove fatal to

¹ See also 'Antiseptic Treatment.'

the organisms, but not to their spores: the latter require a much higher temperature. Hot *moist* air is incomparably more antiseptic than dry air at the same temperature.

Inspissated discharges are far less favourable as soil for the growth of bacteria than are fluids. Referring to this, Lowe (of King's Lynn) observes, 'Whatever hinders motion retards germ-action, and so we are brought to see the force of those admirable lectures of the late Mr. Hilton, on the value of rest in surgical treatment. If anything in the world is antiseptic, it is rest.'¹ There are strong reasons for believing that certain substances are especially destructive to particular species, *e.g.* quinine to bacillus *malariae*. Koch says that 'Eidam came to the conclusion that different forms of bacteria require different conditions of nutriment, and that they behave differently towards physical and chemical influences.' But it is not too much to hope that the marvellous resources of organic chemistry may soon prove to us that in science, as in law, there is 'no wrong without a remedy.' The discoveries of Pasteur, Chauveau, and Toussaint suggest the possibility of applying the principle of inoculation as a prophylactic against many, if not all, specific organisms. Pasteur has shown that by the action of heat and oxygen, organisms, deadly to certain animals, may be so modified that, while preserving the power of infection, they can infect only mildly, and yet protect the inoculated animal against future infection by more active organisms of the same species.

Some of these specific infective diseases, though afterwards general, are at first local, and can be cured by excision. Such, *e.g.*, is anthrax. Fehleisen found that if he inoculated a rabbit's ear with erysipelas and amputated it ~~within~~ twelve hours the operation was successful.

Moles when on the face may, if small, be excised, and, if large, transplanted 'by exchange.' (See *Lancet*, Feb. 19, 1887.)

Mollities Ossium. *See BONE, DISEASES OF.*

Mouth, Deformities of. *See CLEFT PALATE, HARE-LIP, AND MACROSTOMA.*

Muscles, Diseases of.—The chief are: 1, Atrophy and de-

¹ See a philosophical article in *Brit. Med. Journ.* for July 14, 1888.

generation ; 2, contractions ; 3, inflammation ; 4, paralysis ; 5, parasites (trichiniasis) ; 6, syphilitic affections ; 7, tumours. Some of the above are primarily nervous affections, but they are placed here for the sake of convenience.

MUSCLES, INFLAMMATION OF.—Chiefly occurs as an extension from inflammation of neighbouring parts, or as a result of injury, or of syphilis. Liable to end in abscess, which may be very troublesome, especially in certain parts, *e.g.* abdominal wall. Considerable pain and constitutional disturbance. *Treatment.*—Local rest, poultices, &c.

MUSCLES, ATROPHY, AND DEGENERATIONS OF.—Four chief forms, *viz.*, 1, simple atrophy ; 2, granular degeneration ; 3, fatty degeneration ; 4, 'waxy' degeneration. *Simple atrophy* is the form which occurs from disuse, as, *e.g.*, in chronic joint-disease. Microscopically there are abnormally few striated muscle-fibres, and the appearance becomes more that of fibrous tissue. *Waxy degeneration* occurs as a sequel of continued fevers. All the forms of degeneration are found in progressive muscular atrophy. The microscope shows, in the case of fatty degeneration, numbers of fat-cells in the place of the muscle-fibres, and, in the case of waxy degeneration, a 'homogeneous, colourless, glistening mass.'

MUSCLES, CONTRACTURES OF.—*Causes.*—1, inflammation of, or abscess in the muscle ; 2, disease of nerves or nerve-centres ; 3, reflex irritation, *e.g.*, from worms (intestinal irritation), phimosis (sexual irritation) ; 4, 'antagonism,' *i.e.* contraction of one set of muscles because its opponents are paralysed ; 5, continued relaxation of a muscle, *e.g.* the state of the flexors of a limb which has long been kept on an angular splint. Muscles in such a state tend to become permanently shortened. Most cases of paralytic talipes are probably caused by the limb permanently assuming a certain position under the influence, not, as was formerly supposed, of true 'antagonistic' contractions, but of mere gravity ; 6, mal-development ; but a muscle which has never been developed to its proper length cannot be properly termed 'contracted.' *Treatment.*—In a few cases it is sufficient to remove the cause, *e.g.*, to circumcise for phimosis, or to give santonin and scammony for worms. In mild and

in paralytic cases, regular manipulation by stretching or continuous mechanical extension may suffice. But often tenotomy is indicated. *See CLUB-FOOT.* Tenotomy should be followed by mechanical extension, either gradual or immediate and total.

MUSCLES, PARALYSSES OF.—Almost all cases which the surgeon has to treat may be classified as—1, those arising from injury to nerves or nerve-centres (*see NERVES, INJURIES OF*) ; 2, those arising from direct blows on a muscle ; 3, infantile paralysis ; 4, Duchenne's disease ; 5, paralysis from disuse ; 6, neuromimetic or hysterical paralysis. Paralyses from direct injury require rest till tenderness has disappeared ; afterwards, manipulation, rubbing, kneading, and passive exercise.

INFANTILE PARALYSIS.—*Causes.*—Can sometimes, but rarely, be traced to catching cold. Almost, but not quite, exclusively a disease of childhood, from infancy to the fourth year, inclusive. Four times as common in summer as in winter (Sinkler). Similar, though perhaps not identical, paralyses occasionally follow acute diseases, such as measles. *Symptoms.*—Sudden commencement, usually with fever ; sometimes with severe cerebral symptoms (deafness, delirium, coma, general convulsions). Very rapidly developed, complete paralysis of certain parts, with entire relaxation of the affected muscles. Parts affected, variable ; generally lower limbs. Sometimes one or both arms, or separate muscles, *e.g.* deltoid. Serratus magnus sometimes affected (Lees, *Clin. Soc. Trans.* 1879). The muscles atrophy, the development of the bones is retarded, and, the local circulation stagnating, the limbs become cyanotic. But the general health and nutrition remain vigorous, and there is no affection of the sphincters, nor any considerable disturbance of sensation. In the course of time deformities result, *e.g.* talipes, contracted knee, &c. *Pathology.*—Essentially an inflammation of the anterior horns of the grey matter of the spinal cord, especially in the lumbar and cervical enlargements. *Prognosis.*—Little or no danger to life or general health, except indirectly from the crippling. But little hope of important benefit from treatment except orthopædic. *Treatment.*—In early stages treat the main affection vigorously (of course not forgetting patient's tender

age). Strips of blister along spine, near cervical enlargement in case of paralysis of upper extremities, near lumbar when legs are affected. Cathartics. Ergotine, belladonna, or pot. iod. internally. Prone position if possible. Cold affusion for severe head-symptoms. Later on, galvanism. Constant current to spine itself. Large electrodes, one to cervical or lumbar enlargement, other to anterior surface of trunk. Alternate place of anode and cathode every two minutes. Persevere, at intervals, for years (Erb). Faradic electricity to affected muscles. Anode to spine or nerve-trunks ; cathode to muscles. Fresh air, good diet, cod-liver oil, warm clothing to limbs. Massage, friction, 'beating' sea-baths. Orthopaedic treatment and appliances.—To prevent the necessity for these, keep the paralysed limbs in a good position when at rest. Paralytic deformities are mainly caused by action of gravity, but partially perhaps by antagonistic contraction of the stronger muscles.

DUCHENNE'S DISEASE, OR PSEUDO-HYPERTROPHIC PARALYSIS.—*Cause* unknown. Age, childhood. *Three Stages* : (1) of weakness of muscles of lower limbs ; (2) of gradual hypertrophy of, successively, gastrocnemii, glutei, and lumbar muscles, weakness still persisting ; (3) of wasting and increased paralysis. Idiocy is often co-existent. *Pathology*.—The muscular enlargement is due to growth of connective tissue and fat. Charcot, Cohnheim, and others have examined the spinal cord with negative results ; but Gowers and Drummond (of Newcastle) have found disintegration in the grey network of the lateral columns adjacent to the grey substance, best marked towards the lower dorsal and lumbar region. (See *Lancet*, Oct. 15, 1881.) *Prognosis*.—Bad. Quite hopeless in third stage. *Treatment*.—Electricity ; manipulation ; massage.

PARALYSIS FROM DISUSE is practically identical with atrophy, and requires massage and passive or active exercise.

HYSTERICAL PARALYSES. *Vide Hysteria.*

MUSCLES, TUMOURS OF.—Almost any variety may occur. Sarcomata probably most common. Ossifications of muscles themselves present appearance of hard tumours. Such ossifications sometimes affect the adductors of cavalry soldiers

('rider's bones'). Cysts. Cancer. The *Trichina spiralis*, a nematoid worm, is a parasite which lies encysted in the muscles of patients affected with 'Trichiniasis,' as the affection is termed.

MUSCLES AND TENDONS, RUPTURE OF.—Tendo Achillis and quadriceps extensor of thigh most often affected. Occurs chiefly in middle age. *Treatment.*—Fix in a relaxed position for a fortnight. Resume use cautiously and gradually.

Nævus. *Vide TUMOURS, VASCULAR.* (Angeiomata.)

Nails.—Chief affections.—In-growth, onychia, hypertrophy, and psoriasis.

NAIL, IN-GROWN TOE, is really the overgrowth of the flesh at the side of the nail, caused by pressure of boot and by not cutting the nail square. *Treatment.*—Bad cases require perfect rest. With the point of a penknife insinuate a little cotton-wool beneath the side of the nail and between the edge of the nail and the overlapping flesh. Avoid cutting the nail. Poultice and rest thoroughly if there is much inflammation. In a few cases avulsion of the whole nail (of course, under either local or general anaesthesia) is necessary.

ONYCHIA.—An ulceration of the matrix of a nail. Varies much in severity. The worst cases are termed '*Onychia maligna*.' *Causes.*—Bad constitution; weakly children especially liable; local injury, neglect, syphilis. *Signs.*—Ulceration sometimes confined to one angle of the matrix, sometimes extending along both sides and base of matrix. Nail blackens, loosens, and peels off, perhaps in strips. Sanguous, foul discharge. Often great pain. *Treatment.*—Remove whole or part of nail. Carry hand in a sling beneath chin; poultice a day or two; then dress with boracic lint (moist). Nitrate of lead. Ung. iodoformi. Rx. Liq. arsenicalis 3 iij., aquam ad 3j., m. ft. lotio. Black wash. Internally give tonics and cod-liver oil. Pot. iod.

HYPERTROPHIED NAILS should be removed, and measures be taken to protect against local irritation.

PSORIASIS OF THE NAILS.—'The central part of the nail becomes thickened, rough, and scabrous, and unnaturally convex; the free edge is often split; the cuticular fringe at the bottom of the nail is ragged and retracted, leaving a deep

fissure between the nail and the skin of the finger. The whole nail, in an extreme case, resembles the outside of the concave shell of an oyster.' (T. Smith.) *Treatment.*—Smooth down with sand-paper. Dress at the margin with equal parts of ung. picis liq. and ung. hydrarg. ammon. Constitutionally give arsenic or antisyphilitics, as may be indicated. Remember that *parasitic* disease of the nails—'ringworm'—occurs, but with extreme rarity. May be detected by the microscope.

Neck, Injuries of. *See* SPRAIN; THROAT, CUT; SPINE, DISLOCATIONS OF, &c.

NECK, CONGENITAL FISTULÆ IN, called 'Branchial Fistulæ,' because they are probably due to incomplete closure of the branchial clefts. Very small; usually give exit to a serous discharge.

NECK, TUMOURS OF, are usually enlarged glands, or abscesses resulting therefrom. More rarely adenomata, lymphomata, cysts, 'hydroceles,' aneurism, or cancers. *See also* BRONCHOCELE. Lipomata not uncommon at back of neck. The neck and throat are, as Langenbeck remarks, the only parts in which sebaceous cysts are found deeply seated. They may have attachments to the larynx, pharynx, or even the carotid sheath. Their removal, therefore, requires some care. Walsham recommends that it should be effected through the mouth, in order to avoid a scar.

NECK, HYDROCELE OF.—A cystic tumour, usually situated at the base of the posterior triangle. *Contents.*—Yellow or brown serous fluid. *Diagnosis.*—By fluctuation and transparency. *Treatment.*—Tap, and inject with iodine.

NECK-MUSCLES, CLONIC SPASMS OF THE.—This distressing affection has been greatly relieved, if not cured, by a plaster of Paris casque (Cabot).¹

WRY-NECK.—Depends on contraction of the sterno-mastoid. (Besides true wry-neck, there are hysterical wry-neck and a spurious wry-neck, caused by caries of the cervical vertebræ.) *Causes.*—*Vide* MUSCLES, CONTRACTION OF.—*Symptoms.*—Distance from ear to sterno-clavicular articulation, shortened on side of contracted sterno-mastoid. Head bent over towards,

¹ *Boston Med. and Surg. Journ.*, April 27, 1880.

and face turned away from, same side ; head also bent downward. Contracted sterno-mastoid feels tense, especially when an attempt is made to raise head. Curvature of spine a frequent secondary result. Arrested development of face on affected side. Other muscles besides sterno-mastoid sometimes contracted. *Treatment*.—Divide sterno-mastoid subcutaneously and afterwards fix the head straight or slightly inclined towards opposite side by a special machine, or by strapping and bandages, or by weight-extension. *Division of sterno-mastoid*. Divide close to origin. Divide sternal and clavicular heads separately. Turn edge of knife towards skin, first passing blade beneath muscle. Do not insert knife too deeply ; as death has occurred several times from wounds of important vessels. Cut freely down on the muscle and divide it openly, if subcutaneous myotomy does not give a good result. Anti-septic precautions. *After-treatment* must be persevered in for a month or two. Manipulation suffices towards the latter part of the time. For hysterical wry-neck division of sterno-mastoid is prejudicial rather than useful. Treat on the principles laid down for *Hysteria*, *q.v.* In wry-neck from spinal caries, treat the prime disease.

Nephrectomy.—Extirpation of the kidney. First successfully performed by Simon of Heidelberg, in 1871, and during the next ten years, about seventy times with thirty deaths. *Reasons for Operation*.—(1) early stage of scrofulous kidney ; (2) renal calculus ; (3) cystic disease, 'hydronephrosis,' or other form of renal tumour if not carcinomatous ; (4) fistula of ureter ; (5) certain severe injuries to kidney. *Operation*.—Incision either (1) lumbar, or (2A), abdominal and median, or (2B) abdominal along outer border of rectus (Langenbuch). The last appears to be the most convenient, to give the most space, and be the most free from haemorrhage. In every nephrectomy the kidney has to be enucleated from its capsule, sometimes a difficult proceeding, liable to be attended with sudden and severe haemorrhage. In the case of large cysts or abscesses, they may have to be emptied early in the operation. The renal vessels have to be tied. The ureter and vessels may be tied separately or together, or both ; or the ureter may

be brought out of the pararectal abdominal incision and fixed with a pin (Knowsley Thornton). All bleeding vessels should be carefully tied, and every possible care taken to keep or make the wound aseptic. The fatal cases have mostly died of shock, haemorrhage, peritonitis, septicaemia, or prolonged suppuration.

It is very important, before operating, to judge of the state of the other kidney. In the female, catheterism of the ureter has been recommended in order to get the unmixed urine of one kidney. If by lumbar nephrotomy or by repeated aspirations of the kidney known to be diseased the urine coming per urethram has been made healthy, the presumption is decidedly that the other kidney is healthy.

Youth is a very favourable element in prognosis ; so also is an early stage of disease.

Avoid morphia in the after-treatment.

With regard to operations so modern and peculiar as nephrectomy and nephrotomy, there must be many important questions still unsettled, e.g.—(1) When should the one operation be preferred to the other ? (2) Under what limitations should excision of renal cancer be placed ? Time and accumulated experience will be required to answer such questions with precision. There are excellent articles on nephrectomy, with statistics, by Czerny, of Heidelberg, in *Trans. Intern. Med. Congress*, 1881, by R. L. Weir, in *Annals of Surgery*, April 1885, and by S. W. Gross in *Amer. Jour. of Med. Sci.* July 1885.

Nephroraphy.—When the symptoms of movable kidney have reached a sufficient grade of severity, it is justifiable to withdraw it into a wound in the loin, and there fix it with deep and superficial sutures (Nephroraphy).

Nephrotomy.—Cutting into the kidney. Done either with the object of extracting a stone, or with a view to thorough drainage.

As the diagnosis of renal calculus is often difficult, an exploring needle may be used (Bennett May). If an incision is made down to the kidney, it is to be borne in mind that palpation of the anterior surface is more likely to discover a stone

than that of the posterior surface, because the posterior relations of the kidney afford a firmer counter-resistance.

In cases of pyonephrosis, excellent results have sometimes been obtained from incision of the kidney and free drainage with antiseptic precautions.

When obstructed ureter can be diagnosed, the indication is, doubtless, either to drain antiseptically or to aspirate the kidney.¹

Nerve, Excision of, partial, occasionally done for obstinate neuralgia.

Nerve-stretching.—An operation now frequently done in cases of (1) neuralgia ; (2) locomotor ataxia ; (3) spastic contraction ; (4) tetanus ; (5) epilepsy ; (6) peripheral paralysis ; (7) lepra. For neuralgia it is most valuable, though the good effects are not always immediate. In locomotor ataxia, it often relieves or removes the pain, and occasionally benefits the ataxia. In spastic contraction it has sometimes been very successful. It is far from proved that it has yet done any good in true tetanus. *Operation.*—Take the sciatic nerve for example. Longitudinal incision through fat, commencing about level with the fold of the buttocks, midway between the great trochanter and the tuberosity of the ischium—five inches long. Lower margin of gluteus maximus should be seen. Use retractors lightly and cut straight down to the full extent of the external incision, until with your fingers in the wound you distinctly feel the hamstring muscles. Have them very gently pulled to one side (the inner). Possibly the nerve will at once come into view. If it does not, incise the fat carefully to the outer side of the hamstrings, and immediately below the gluteus maximus. The nerve lies here more or less overlapped by the hamstrings, according to the muscularity of the subject. Beware of stretching the semi-membranosus by mistake. This tendon glistens in a characteristic manner. Lift the patient's limb from the table by the nerve, and pull firmly, both upwards and downwards, for two or three minutes.

(2) 'Bloodless method' of stretching sciatic. Introduced

¹ Recent works of reference on Renal Surgery are those of Henry Morris and Bruce Clarke.

by Trombetta and by Billroth. Patient recumbent: force his knee up to his chin, then, keeping the knee near the chin, extend the knee fully.

EFFECTS ON THE NERVE.—They consist of lengthening of the nerve, its sheath, and individual fibres, compression of the last, practical obliteration of the lymph space between each nerve fasciculus and its perineurium. There is also rupture of the medullary sheath, sometimes even of the tubuli, and, more rarely, of the axis-cylinder.

The pull on the nerve seldom, if ever, reaches the spinal cord. But it reaches the roots of the spinal nerves. Marshall suggests that *nervi nervorum* ramify along the nerves and are torn by nerve-stretching. This hypothesis would account for the benefit in cases of neuralgia.

DANGERS OF NERVE-STRETCHING.—A very large number of patients have now been operated on, and a few have died. Excluding those who have perished from chloroform or from neglect of antiseptic precautions, there appear to have been cases fatal because of (1) disease of the spinal cord set up by the operation—three or four cases; (2) collapse—one case.

If too much violence is used, the posterior roots of the nerves are usually the first parts to give way.

After any operation of nerve-stretching, some amount of loss of sensation and power of motion, more or less persistent, but eventually disappearing, is to be expected.¹

Nerve Suture.—Now frequently and successfully done after accidental division. When performed in a non-recent case, electricity should be persevered with, if necessary, for months after the operation. Half a year may elapse before improvement appears.²

Nerves, Inflammation of.—(1) Acute, (2) chronic. Acute neuritis is uncommon, and is marked by *continuous* pain,

¹ Refer to *Trans. Intern. Med. Congress* (Langenbuch, Erb, Eulenberg, &c.), 1881, vol. ii.; Cavafy, *Brit. Med. Journ.*, Dec. 17, 1881; Symington, *ibid.* May 27, 1882; Stintzing, *Ueber Nervendehnung*, Leipzig, 1888; Marshall, *Bradshawe Lecture*, Dec. 1883.

² Good articles on secondary nerve-suture are Weissenstein's in Von Bruns' *Chirurgische Klinik*, 1884, and Markoe's in *Annals of Surg.*, vol. ii. 1885.

tenderness and swelling along the course of the affected nerve, and often by spasms of the muscles connected with it.

Chronic neuritis.—*Causes.*—Exposure to cold and damp : the same causes combined with injury, injury alone, excessive fatigue, rheumatic constitution. *Symptoms.*—Sometimes like those of acute neuritis, but milder and more persistent. *After death* the nerve is found swollen, injected, and occasionally suppurating. *Treatment.*—General and local antiphlogistics ; rest ; position of relaxation ; leeching ; purgation ; iodide of potassium. Specific remedies when rheumatism, gout, or syphilis is diagnosed.

NERVE, TUMOURS OF. *See* TUMOURS, NEUROMA.

Neuralgia.—Pain in the course of a nerve, and not caused by any visible disease or injury to the parts supplied by that nerve. *Causes.*—(1) Obscure injury to the nerve ; (2) foreign body irritating it ; (3) tumours pressing on it ; (4) compression by contracted cicatrices ; (5) overfilling of veins near nerves as they pass through long canals, *e.g.* infra-orbital canal ;¹ (6) poisons in the blood, *e.g.* malaria, mercury, lead, copper, &c. ; (7) neuralgia appears to be sometimes reflex, and to be caused by irritation of some other nerve than that affected. Lastly, in an immense number of cases, the cause is quite unknown. The exciting cause of a neuralgia is frequently catching cold or exercising the part subject to the complaint. *Pathology.*—When any distinct anatomical change is found, the affection is no longer called a neuralgia, but a 'neuritis,' or whatever may be the nature of the change observed. During a neuralgic paroxysm, there is generally local hyperæmia. *Symptoms and Course.*—Extremely various. Continuous or remittent or intermittent, short or enduring, circumscribed or diffuse, lancinating, aching, or burning. Often relieved, sometimes aggravated, by pressure. Tender spots occasionally found, *e.g.* where lateral intercostal cutaneous nerves pierce the external intercostal muscles in neuralgia of breast. Years sometimes do not suffice to remove obstinate neuralgia. *Treatment.*—Treat cause. Iron in anaemia. Quinine in remittent cases. Anti-rheumatics in rheumatic cases. *Locally* : lin. aconiti ; ung. aconiti ; lin.

¹ Henle, quoted by Niemeyer.

belladonnæ : empl. belladonnæ ; tinct. capsici ; chloroform ; chloroform saturated with iodoform ; blisters ; ether-spray ; hot fomentations ; ice ; ungu. veratriæ. Electricity ; Faradisation, constant current. In obstinate cases of neuralgia, search for 'painful pressure spots' and treat them with weak constant currents, e.g. 10 cells. The *Medical Record* for June 1882 relates how Westphal himself was cured in this way. Nerve-stretching and neurotomy (*q.v.*). Also excision of nerves and nerve-ganglia. *Internally*.—Besides iron, quinine, &c. (mentioned above) chloride of ammonium in half-drachm doses ; phosphorus ; croton-chloral (gr. v. every three hours) ; chloral ; tinct. gelsemimi (m. x.-xv.) ; chloroform ; 'tonga,' in 3j. doses, three times a day ; stomachics ; tonics, &c. *Vide* works on 'Therapeutics.' Change of air and scene ; hydropathy ; colchicum in gouty subjects. Sometimes morphia subcutaneously seems to be the only resource. But such injections are contra-indicated in cases of great debility, in advanced age, in cerebral hyperæmia, and in organic disease of the heart (Erb).

Neurotomy.—Division of a nerve, usually, if not always, for neuralgia. Often successful. Simple division can generally be done with a tenotomy knife subcutaneously, especially in the case of small nerves which emerge from bony canals. Sometimes a part of the nerve is excised. Consult Cadge, *Brit. Med. Journ.* July 15, 1882. On the whole more may be expected from nerve-stretching than from neurotomy as a treatment for neuralgia.

Nipple, Eczema of.—Is important because of the frequency with which it is followed by cancer. On this account it has even been regarded as an indication for amputation of the breast.

Nipple, Sore.—Solid nitrate of silver to any fissure. Ung. hyd. nit. dil. No hard soap in washing. Lotions of zinci sulph. or borax. Leaden shields. Cure any aphtha of child's mouth.

Nipples, Retracted.—When merely a natural conformation, attempt to bring out by repeatedly drawing with the breast-pump.

Noma. *See CANCRUM ORIS.*—Disease attacks external genitals of female children, as well as mouth.

Nose, Diseases of.—Those which require special notice are acne rosacea, lipoma, lupus, epithelioma, chronic nasal catarrh, ozæna, syphilis, tumours (including polypi), and deformities.

ACNE ROSACEA.—Occurs chiefly in young women, in women over 50, and in men advanced in life. *Causes.*—Indigestion. Disorders of sexual system. Local irritation, *e.g.* from exposure to sun and weather. When attacking old men the cause is usually spirit-drinking. *Pathology.*—Cutaneous hypertrophy and capillary congestion. Sebaceous glands not necessarily affected. *Treatment.*—Remove the cause if possible. Regulate the habits. Treat indigestion. *Locally.*—Ung. sulphur. iodidi. Lotio hydrarg. perchlor. (gr. ij.- $\frac{3}{4}$ j.). Bathing with water as hot as it can be borne. Abstinence from stimulants. Riding and driving exercise. The dilated capillaries may be slit up and touched with liq. ferri perchlor.

NASAL CALCULI.—Lime and magnesia salts with mucus. Usually in lower meatus. Remove with a scoop. Break up if necessary.

NASAL CATARRH, CHRONIC.—*Causes.*—Residence in damp, cold localities, repeated acute catarrhs, constitutional predisposition, struma, exposure to draughts, irritating dust, irritation of nasal polypi (and specific causes—see ‘Ozæna’). *Signs.*—Mucous membrane swollen, red, covered with secretion, mucous or muco-purulent, moist, or crusted. Sometimes a nasal tone of voice. Nose may be occluded by swelling of mucous membrane. Pharynx usually also affected. *Treatment.*—Treat the cause. Nasal douche with solutions of chlorate of potash, common salt, phosphate of soda, and carbonate of soda, in hot water (hot water is preferable to luke-warm). Use douche twice a day. Solutions should be just strong enough to taste saline. Later on, astringents should be added in small quantities to the saline washes. Nose not to be blown for a short time after douching. The same fluids may be applied with an atomiser instead of the douche. Inhalation of vapour of chloride of ammonium. Insufflation of powdered alum, bismuth, starch, &c. Solution of bismuth ammonio-cit., and hydrastin. Hazeline: sniff up a small quantity out of the palm of the hand several times a day; use

also as a gargle. There is not the same liability to catching cold after this as after douching with salines. Iodoform powder sniffed up. Iodoform in vaseline (gr. xx.- $\frac{3}{4}$ j.) ; applied with a small brush far up each nostril. With regard to the douche, it should be noted that Professor Roosa, of New York, strongly condemns it as too dangerous to the ears ; and even Professor Cassells, who stoutly defends it, never trusts a patient to use it himself. A syringe is safer. Sleep with a high pillow. Moderate diet. Fish and milk. Avoid stimulants. Cod-liver oil at night sometimes beneficial. Change of air and scene. Dry, elevated regions. Warm climates. Internally, large doses of chlorate of potash.

Nose, EPITHELIOMA OF. *See CANCER.*

Nose, LIPOMA OF.—Integumentary and subcutaneous hypertrophy of alæ and tip of nose. Variable in extent and size. Attacks old men. Fibro-cellular and *not fatty* in structure. *Treatment.*—Remove by suitable incisions.

Nose, LUPUS OF. *Vide LUPUS.*

OZÆNA.—An habitual and offensive odour from the nose, often amounting to a horrid stench, and almost always of a certain characteristic nature. *Causes.*—(1) strumous ulceration, (2) syphilitic ulceration, (3) necrosis from non-specific causes, (4) long-continued chronic atrophic catarrh, (5) foreign bodies impacted, (6) merely a peculiar tendency to decomposition of the nasal secretion. *Seat of disease.*—Any part of nasal walls, or of sinuses opening into nose. *Amount of Discharge* very variable. Often all passes backwards into pharynx. *Prognosis.*—Unless cause can be detected and easily removed, ozæna is almost incurable. When complicated with bone-disease, deformity a frequent result. *Treatment.*—Antisyphilitics for syphilis. Cod-liver oil, iron, arsenic, &c., for struma. Explore nasal cavity carefully with a strong light, a mirror, and speculum. Remove dead bone. Nasal douche with hot alkaline or salino-astringent solutions. (*See NASAL CATARRH.*) Solutions of Condy's fluid. Insufflation of mercurial powders—white or red precipitate, 2 grains to 1 drachm of sugar. Iodoform. (*See NASAL CATARRH.*) Plugs of cotton-wool, advocated by Gottstein, are very effective while in

use. They should be frequently changed. Pugin Thornton recommends spray of solution of borate and carbonate of soda.¹ In syphilitic ozæna of infants, syringe out nostrils with hot saline solutions, and afterwards insert melted ungu. hyd. nitrat. dil., or iodoform ointment. Of course remove foreign bodies. Treatment of ozæna must be persevering, and used twice, or even three times a day.²

Nose, TUMOURS OF, are either (1) 'mucous polypi,' (2) 'fibrous polypi,' (3) malignant, (4) cartilaginous, or (5) osseous. The first three are the most common, especially the first. *Causes.*—As obscure as those of tumours elsewhere; but mucous polypi sometimes appear to arise from long-existing chronic catarrh. *Symptoms and Diagnosis.*—Those of nasal or naso-pharyngeal obstruction, often combined with nasal catarrh and leading to deformity of the face. Mucous polypi may usually be seen and recognised by their pale, semi-transparent appearance and soft consistence. Fibrous polypi cause haemorrhages, are red and firm, are usually single, and are attached to the roof of the naso-pharyngeal cavity. Malignant tumours grow rapidly, bleed, fungate, infiltrate neighbouring parts, cause pain (often considerable), and cachexia. Cartilaginous and osseous tumours are rare, and may be known by their consistence. Very rarely certain extraordinary loose osseous tumours are found in the nose or the adjoining sinuses. *Pathology.*—Mucous polypi are fibro-cellular tumours, or myxomata, or fibro-myxomata. Fibrous polypi are fibro-sarcomata or pure sarcomata. Mucous polypi are usually attached to the outer side of the nasal cavity, especially to the middle turbinated bone. Fibrous polypi spring from the periosteum. They are usually attached towards the back of the roof of the nose. (See CANCER, for the structure of cancerous tumours.) *Treatment.*—Twist and tear out mucous polypi with polypus-forceps. Ordinary dressing-forceps do not usually bite well enough. Afterwards, to pre-

¹ R. Soda carb., soda borat., &c 3ij. ; liq. soda chloratæ 3ss.-ij. ; glycerina, 3j. ; aq. ad 3vijj.

² For an excellent account of recent papers on ozæna, see Kendal Franks, *Dublin Journ.*, vol. lxxiii. p. 383.

vent or delay recurrence, prescribe tannin as snuff, or else spray of solution of sulphurous acid. *A. sulphurosi* (P.B.) j.—*aquaæ* iij. **Polypus-snare.** *Naso-pharyngeal polypi.*—Fibrous polypi, if they cannot be snared, may require operations even of the first magnitude, *e.g.* removal of superior maxillary bone. Other procedures involve cutting through hard and soft palate, or slitting up nose close to middle line ; or cutting a flap in the nose and turning it outwards or downwards ; or Langenbeck's operation, which resembles excision of upper jaw, only that bone, after being turned out, is replaced. Cancer requires excising like fibrous polypus, unless too far advanced.

ABSCESS is an occasional cause of swelling in the nose, especially during syphilitic disease. Open early.

ADENOID VEGETATIONS OF THE NASO-PHARYNX occur in many young people. They vary in size and consistence, and can be diagnosed by the fingers or the rhinoscope, as well as by the thick speech, collapsed nostrils, open mouth, and well-known general facial appearance of such patients (usually, but erroneously, attributed entirely to the enlarged tonsils which are frequently co-existent).

They cause also chronic catarrh, tending to spread to the ear.

They should be thoroughly removed, either by erosion or cauterisation. For full details see Meyer (Copenhagen) in *Trans. Intern. Med. Cong.*, vol. iii. 278.

Nose, DEFORMITIES OF.—Congenital are very rare. Flattening from syphilis or from accident is difficult to treat, especially the former. To raise a nose depressed by fracture, instruments such as those of Adams and S. Gamgee may prove useful. Lateral deviation of the septum nasi can be cured by forcibly bending, or rather breaking the septum, into correct position, and then keeping it so by means of properly shaped plugs in the nares. These are removed after a few days.

Œsophagoscopy.—Miculicz says that with the electric-light œsophagoscope, made by Leiter of Vienna, every disease of the œsophagus can be easily diagnosed. (*Wiener Med. Presse*, 1881, Nos. 45-52.)

Œsophagotomy.—Scalpels, forceps (dissecting and artery),

retractors, director, probe, œsophageal forceps, or some other long curved instrument, to act as a staff passed down the œsophagus. Place a pillow beneath shoulders. Incision four or five inches along anterior border of sterno-mastoid (left, unless foreign body project to right), with its centre opposite position of foreign body. Proceed as in tying carotid ; but, instead of opening carotid sheath, retract it and its contents outwards. Retract larynx the other way. In opening œsophagus, take care not to wound recurrent laryngeal nerve. Feed for a few days through a narrow, soft, œsophageal tube passed through nose or mouth and beyond wound, and left in situ. *Prognosis* very good.

Œsophagotomy, Internal.—May sometimes be done for cicatricial contraction. Direct edge of œsophagotome backwards. For cases, &c., see Sands, *Proc. New York Surg. Soc.*, October, 1885.

Œsophagus, Foreign Bodies in.—May lodge in any part, but usually stop at commencement, just behind cricoid cartilage.

Symptoms.—Local pain, especially on attempting to swallow. The character of the pain and the presence or absence of dyspnoea depend on the nature and size of the body. So also do the *prognosis* and *treatment*. A soft, soluble, or macerable substance may pass eventually with little or no external assistance, or may easily slip down before a probang. A pin may be caught by the horsehair probang, and a coin by the 'coin probang,' or either may be brought up by forceps, such as those of Bryant. But large jagged bodies may demand a cutting operation ; and when they cannot be recovered by less serious means œsophagotomy had better not be delayed. Urgent dyspnoea may demand laryngotomy or tracheotomy. Oil the probangs and œsophageal bougies before using them. The fingers are useful, not only for examining the pharynx, but for hooking out foreign bodies from its lower end. If the foreign body reach the stomach, keep the patient in bed, and give large quantities of bulky food, but no drugs. Gastrostomy may be required.

Œsophagus, Stricture of.—*Forms* : 1, cicatricial after

injury ; 2, idiopathic fibrous thickening ; 3, syphilitic ulceration ; 4, cancer ; 5, pressure of neighbouring tumours. No. 2 is very uncommon ; No. 4 is, unfortunately, not so. The most usual form of tumour which compresses the œsophagus is a thoracic aneurism. *Signs.*—The essential one is dysphagia—difficulty of swallowing. This may come on so gradually as to be unperceived until the power of swallowing anything but the smallest morsels has been lost. More or less pain. Progressive emaciation. The most terrible symptom to the patient is the feeling of unappeased hunger. Ulceration is indicated often by foetor of the breath, or by the presence of blood on a bougie passed gently. To *diagnose* the nature of the stricture, whether cancerous or syphilitic or simple, consider the age, history, and collateral symptoms of the patient—*e.g.*, a tumour may be felt at the root of the neck, or cancerous glands may be found in the neck, or examination of the chest may discover indubitable symptoms of aneurism, and so on. The patient's feelings are deceptive as to the locality of the stricture, he usually referring it to beneath the manubrium sterni. *Prognosis.*—In most cases, death from starvation, sometimes from haemorrhage or the spread of cancer. Difficult to treat even a fibrous stricture successfully with bougies. Great gentleness, tact, patience, and perseverance may succeed. Whenever the cause can be removed, the prognosis is good, unless there be a severe ulceration, likely to be followed by cicatricial contraction. *Treatment.*—First examine with a well-oiled bougie. If one can be passed gently, try to gradually dilate by passing from day to day increasing sizes, unless the cause be manifestly pressure from without, *e.g.* aneurismal. If the cause be clear, of course treat it. In case of doubt, iodide of potassium and rest are generally worth a good trial. Excision of cancer of the œsophagus has hitherto been unsuccessful ; but the results of gastrostomy (*quod vide*) have lately been somewhat more encouraging than formerly. Life can be prolonged by nutrient enemata when swallowing has become impossible.

Olecranon Process, Fracture of. *See* FRACTURES.

Oophorectomy. *See* APPENDIX ON UTERINE SURGERY, &C.

Orbit.—An enlargement here may be aneurism (*quod vide*)

or abscess, or enlargement of lachrymal gland, or exostosis, or hydatids, or cancerous or other tumour.

Periostitis of orbit may be confounded with enlargement of lachrymal gland. Acute necrosis of orbit may occur.

Ossifications. See EXOSTOSIS, RHEUMATIC ARTHRITIS, TUMOURS, &c.

Osteitis. See BONES.

Osteoclasis.—Deliberate surgical fracture of a bone to rectify its shape or the shape of a limb. (1) manual, (2) instrumental. The best osteoclast is that of Robin of Lyons. The proximal part of the bone should be fixed absolutely, as it were in a vice. Then the distal part can be used as a lever. If a joint intervenes and is liable to be sprained, as in osteoclasis for genu valgum, a machine such as Robin's should be used. This is described in the *Annals of Surgery* for 1887, vol. i. See also Pousson's book, *De l'Osteoclasie* (Bailliére et fils) a clever, but special-pleading work. Manual osteoclasis is only fit for quite young children, except in the case of recently united fractures in adults (say within three to six months of the date of original fracture).

Osteotomy.—A term now practically confined to the division of bone for deformity, with, at most, the removal of a wedge-shaped piece.

Instruments.—Saws, osteotomes, and chisels. Saws are very narrow, and either blades or chains. Osteotomes resemble chisels, but they are bevelled on both surfaces, while the chisel proper is bevelled only on one. The temper of the steel and angle of the bevel are of high importance in the case of osteotomes and chisels. Improper instruments would easily cause fatal results, or, at all events, splintering of bone, great shock, perhaps failure to attain the object aimed at, and occasionally a piece of the chisel left in the bone. A proper osteotome can be driven by a mallet through the femur of an ox without splintering the latter or damaging itself. Never use a hammer. Osteotomes are used for simple division. Chisels are entirely unfit for this purpose except in the case of very small bones, and should be reserved for removing wedge-shaped pieces.

Place limb on a sand-pillow (moistened and covered with waterproof).

Management of the Saw.—Adams's is commonly used. It has a shank, and is usually pointed. The soft structures are incised with a long tenotomy-knife down to the bone, and the periosteum is cut with the same knife. The orifice of the incision is usually only half an inch long, or even less. The knife being withdrawn, the saw is passed into the tunnel just prepared for it, and its cutting edge turned to the bone. The saw is generally withdrawn when two-thirds of the bone are divided, then the remainder is broken.

Use of the Osteotome.—Insert a scalpel right down to the bone at the place to be divided. Wait two or three seconds, to give the muscles penetrated time to quiet, then complete incision. Size of incision may at first be large enough to admit finger. As operator gains experience he will venture safely to dispense with this, and pass in the osteotome alone. Incise in line with the bone to be divided. Rotate osteotome when it reaches the bone. Do this lightly, so as not to damage the periosteum. Hold handle of osteotome firmly in left hand, with ulnar border of that hand against the skin of the limb. The direction and management of the instrument vary with the site of operation. As a rule, cut away from large arteries and divide the hardest part of the bone first. When removing the osteotome, keep the thumb and first two fingers closed upon it, and gradually work it out by alternate contractions and relaxations of the other fingers. When two-thirds of the bone are divided, the rest can usually be broken.

In using the *chisel* turn the bevelled side towards the wedge. If the wedge is to be thick, cut a thin wedge first and chip away other pieces from each side of the gap.

Never use either osteotome or chisel as a lever to break bone. Keep saws, osteotomes, and chisels bright and free from rust, or they clean themselves in the bone. Check all haemorrhage before dressing. When both limbs are osteotomised, the first wound can be compressed with an antiseptic sponge and gauze bandage while the other is being operated on. Sponge-pressure always useful when there is a tendency to

recurrent haemorrhage. Operate strictly antiseptically. Cut away any projecting cellular tissue, as it delays cicatrisation. Use no drainage-tube unless some accidental circumstance occurring during the operation leads you to expect danger of tension and suppuration. Healing usually takes place by organisation of blood-clot (*see WOUNDS*), but by granulation where cellular tissue is exposed uncovered by blood.

After-treatment.—Take temperature morning and evening. A temperature of 101° demands inquiry. It may rise from some quite accidental complication independent of the operation, or from a tight bandage, or from an accidental sore-throat or trivial ailment. If it cannot be thus accounted for, expose and examine the wound. After osteotomy of the lower limbs, unless the divided bone is supported in a firm plaster case, some contrivance is useful to facilitate defaecation, *e.g.* a mattress with a movable centre-piece. Immediately after the bone has been divided, it should be put into the position ultimately required. After osteotomy of the limbs, attend during the first forty-eight hours very carefully to the state of the toes or fingers, as the case may be. They should be free from numbness and obstructed circulation. Permeation of discharge should be looked for from day to day, though it seldom occurs after the first two days. So long as it is absent the dressing does not need removal.

GENU-VALGUM, OSTEOTOMY FOR.—*Place of incision for Macewen's Operation.*—On the inner side of the limb, at a point where the two following lines intersect one another: a line drawn a finger's breadth above the level of the upper border of the external condyle, and a line drawn parallel to and half an inch in front of the tendon of the adductor magnus. *Management of Osteotome.*—To begin with, place it against posterior part of inner border of femur and cut from behind, forwards and outwards, away from femoral artery. Remember that, just above the condyles, the outer border of the femur is thicker than the inner.

Place of incision in Chiene's Operation.—‘An incision two to three inches in length is made over the tubercle’ (that of the adductor magnus), ‘and is carried upwards for a sufficient

distance.' *The Wedge.*—'The long axis of the wedge runs downwards and outwards towards the notch between the condyles.' Grasp the tibia at its lower extremity, and by pressure *inwards* bend the neck of bone attaching the condyle to the femur. (See *Edinburgh Medical Journal*, 1878.)

Ogston's Operation for Genu-valgum.—If the genu-valgum be severe, operate with the knee bent; otherwise, with the knee extended, a tenotomy-knife is inserted at a point as far back as the level of the internal condyloid ridge, and about four inches above the most prominent point of the internal condyle. It is passed downwards, outwards, and forwards, to the notch between the two condyles, until the point can be felt projecting in front of that notch. Before withdrawing it, the periosteum and cartilage are incised. An Adams's saw is now passed in, and the internal condyle sawn two-thirds off. Now, extending the limb (if it has been flexed hitherto), and using the tibia as a lever, with the operator's knee as a fulcrum, the limb should be bent inwards till the internal condyle cracks off and slips upwards. With splints and pads place and keep the limb straight till union has taken place. Commence passive motion about the end of the third week. Of course use strict antiseptic treatment. (See *Edinburgh Medical Journal*, March 1877.)

Dressings, &c., of Osteotomies for Genu-valgum.—See general remarks above. Well and judiciously padded box-splints are commonly used. But, as few or no changes of dressing are usually required, the limb can be once for all fixed in a moulded case of plaster of Paris or similar material. It is often necessary to put up the limb in a position of varum, because of the laxity of the ligaments (or, in the case of children, of the elasticity of the bones ?). It is well to relax the appliance and inspect the limb after a fortnight if the patient be a child. If the valgum then appears only partially corrected, put up again in a position of varum.

OSTEOTOMY FOR ANKYLOSIS OF HIP IN A BAD POSITION.—If there be a good neck to the femur—in other words, if the great trochanter appear to be set far enough away from the os innominatum—divide the neck of the femur. Otherwise it is much easier to operate below the great trochanter. The former

operation, however, gives such splendid results that I have latterly done it in cases where the neck was almost entirely destroyed.

Division of Neck of Femur with an Osteotome.—Trisect a line between the ant. sup. spine of ilium and the ant. sup. angle of the great trochanter. At the junction of the inner and middle thirds pass in a sharp-pointed steel director backwards, inwards, and a little downwards, till it stops at the neck of the femur.¹ Along this director pass a scalpel down to the bone; first cut towards the trochanter; then, rotating the director and re-inserting the scalpel, cut towards the anter. sup. spine. The incision should just admit the forefinger. Do not withdraw the director till the osteotome is inserted. Rotate osteotome so as to bring it across the neck of the femur, cut nearly through, and break the rest.

Division of Neck of Femur with Saw (Adams's operation).—W. Adams passes in a long tenotomy-knife 'a little above the top of the great trochanter,' and straight down to the neck of the femur. He divides the muscles and 'opens the capsular ligament freely.' A narrow-bladed saw is passed into the wound and across the front of the neck of the femur, with its flat side against the bone. It is now turned on edge and the division accomplished.

Volkmann's Cuneiform Osteotomy of the Hip.—In this operation a longitudinal incision is made on the outer and posterior aspect of the trochanteric region. A wedge is then removed from the femur and the bone finally snapped in two. This is as easy and exact an operation as simple infra-trochanteric division of the bone, and as effectual in remedying the deformity as supra-trochanteric, but it makes a larger wound, less easy to keep aseptic.

¹ Generally there is no normally placed and shaped neck, but a mass of irregularly placed and shaped bone uniting the femur to the os innominatum. When this mass is very large and short, and the femur much adducted, the inner part can be most safely divided through an incision commencing an inch or so below the ant. sup. spine and extended downwards in the axis of the limb. This should be large enough. With the two incisions, the extent and position of the bone to be divided can be satisfactorily made out. The division must be pretty complete, as the short distance between the iliac crest and the site of operation gives very little leverage for breaking purposes. Refer to a paper by the author, *Brit. Med. Journ.*, Feb. 9, 1884.

I have osteotomised the hip now twenty-three times, and hope shortly to publish a comparative study of the different methods of performing the operation and the indications for each.

When the hip cannot be thoroughly straightened out immediately after the operation, the action of weight or of forcible extension on the leg can be helped by a plaster of Paris corset on the trunk to hold the spine straight and the pelvis fixed. After osteotomy of the neck of the femur the position should be rectified at once, and the patient placed in a double splint. See that the patella looks forwards (being neither inverted nor everted). Tenotomy of the adductors and of the tensor fasciæ femoris often required.

REMOVAL OF WEDGE OF BONE FOR CURVATURE OF TIBIA.—Use a chisel. Make a single incision; the loose skin will permit this to be moved up and down. The wedge need not go more than three-fourths through the bone. Supposing it to be made at the apex of the angle of curvature, its upper surface should be at right angles to the border of the tibia above, and its lower surface at right angles to the border of the tibia below. When adjusting the bony surfaces avoid nipping muscle. The fibula can either be broken or divided through a separate incision of the soft parts. See general directions above.

Every commencing osteotomist should study Macewen's book.

Ovariotomy. *See APPENDIX.*

Ozaena. *Vide NOSE, DISEASES OF.*

Palate.—**CLEFT PALATE.**—A congenital deformity, due to non-union of palate plates of palate bones and superior maxillaries with their fellows, or of the superior maxillaries with the præmaxillaries, or to non-union of the two halves of the soft palate. The amount of imperfection varies from merely bifid uvula to a complete chasm from pharynx to face. Often complicated with hare-lip. The parts affected are more or less stunted in growth; hence width of cleft varies. **Treatment.**—An infant with cleft-palate cannot suck; hence it requires hand-feeding. But it should be hand-fed with its mother's milk only, for the first two months. 'For feeding, the infant

should be held upright so that the fluid may run easily into the pharynx.¹ Upon all cases, except a few in which the cleft is too wide, a plastic operation must be done. If possible, operate before the child has begun to talk. When the cleft is hopelessly wide, let a dentist fit the mouth with an 'obturator' of gold or vulcanised rubber.

STAPHYLOPHARYNX (for cleft of soft palate).—Essential steps of the operation are three, viz. : (1) paring edges of cleft ; (2) uniting them by sutures ; (3) incising to relieve tension. Chloroform children. Anæsthesia optional in case of adults. B. Wainewright and also Wolff (of Berlin) operate with the head dependent. Insert Smith's gag. (It is as well to see that this gag fits on the day before the operation.) The edges are pared by means of long forceps and long-handled knife. Avoid unnecessary and rough sponging, as it increases flow of saliva. Sutures are a yard long, and of horsehair, catgut, silk, and silver wire. Their strength is in the inverse order in which they are named here. The ends of silver wire may irritate the tongue. Alternate sutures of horsehair and silk answer well. The sutures are passed by long-handled and curved needles. Startin's needle. Plan of passing thread through one flap, then through loop of a thread already passed through other flap, and lastly dragging it completely through by means of this loop. There is a simple little instrument for twisting wire sutures. Pass most of the sutures before tying one. Check bleeding before tying. Bleeding rarely troublesome. Iced water, gentle pressure with small sponge, and waiting a minute or two, suffice to check it. The accessory incisions to relieve tension may be done (1) just before the operation, or (2) just after the operation. They are either (1) simply lateral cuts parallel to the cleft and close to alveoli, or (2) more scientifically planned proceedings to divide levatores palati and palato-pharyngei. Palato-pharyngei divided by merely snipping across posterior pillars of fauces. Two ways of dividing levator palati, viz., Fergusson's and Pollock's. Few people competent to perform either with certainty after merely reading a verbal description ; while anyone can do

¹ Edmund Owen's *Surgical Diseases of Children*.

either after half a minute's practical illustration. Fergusson divided the perpendicular part of the levator palati midway between the Eustachian tube (its origin) and the hamular process, where it bends into the palate. Pollock divides the horizontal part of the levator palati as it lies in the soft palate. Fergusson used a rectangular knife, which he passed through the cleft in the palate. Pollock uses a straight knife, which he passes *through* the soft palate close to the hamular process (which can be felt with the finger). 'If the palate will not come easily together, two lateral oblique cuts may be made, one on either side above the highest suture, separating the soft from the margin of the hard palate to a small extent.' (T. Smith.) These cuts should be made on the nasal aspect of the palate, and with scissors curved on the flat.

HARD PALATE, OPERATION FOR CLEFT OF.—Resembles, in principle, that for cleft of soft palate. Mucous membrane and subjacent periosteum are scraped from lower surface of palate plates. Incisions are made along alveolar border of palate, the edges of the cleft having been pared. Then the loose dependent flaps are brought together in the middle line, and united by strong sutures. Beware of 'button-holing' the flaps in scraping them, and of drawing the sutures too tight. Various forms of raspatories may be used. In separating the flap from the bones, work from without inwards.

When to remove Sutures.—Lower two on second day, the rest alternately, according to position, on third and fourth day. *Soft food* till union is complete. The less conversation the better. The last observations apply to both hard and soft palate. Cleft of both hard and soft palate may be dealt with at one operation.

PALATE, NON-MALIGNANT TUMOURS OF, are usually either (1) cystomata, or (2) fibromata, or (3) papillomata. *Abscess* also occurs.

PALATE, ULCERATION OF, a frequent result of syphilis, but not always specific. *Treatment.*—Mercurial gargles and specific remedies.

PALATE, PERFORATION OF, the result of disease (syphilis, more rarely small-pox and measles) or injury, may require an obturator, or an operation as for cleft palate.

Paracentesis Abdominis.—*Position of Patient.*—On side near edge of bed. An ink-mark may be made exactly in median line, midway between umbilicus and pubes, as patient lies on his back before turning him on his side. *Preparation.*—Ascertain by percussion presence of fluid in spot to be pierced. Bladder should be empty. Apply a broad flannel belt round abdomen with its ends behind held by an assistant, who keeps up gentle pressure while the fluid flows, and finally secures belt. The tapping may be done through a hole in it. Use a cannula with an india-rubber tube leading into a bucket. Have ready strapping and pad to apply after operation. Asepticise skin and instruments. Incise skin at point where trocar is to be thrust in. *Dangers.*—(1) Haemorrhage, from not keeping to the middle line ; (2) wound of bladder, from not emptying it ; (3) wound of bowel, from not tapping in a thoroughly dull spot, or from plunging trocar in too deeply ; (4) fainting.

Paracentesis Pericardii.—An operation of extreme delicacy. Use the aspirator. *Place of Puncture.*—Fifth intercostal space, one inch from sternum. Mark spot with ink. Use No. 1 or 2 Dieulafoy's needle. Aspirator cock must be turned as soon as needle-point is beneath skin, so that fluid may rush through needle the moment pericardium is opened. Direct needle upwards and inwards, and hold it perfectly steady. The experience of Samuel West¹ and Rosenstein seems conclusive as to the desirability of making a *free* opening in purulent pericarditis. Use antiseptic precautions.

Paracentesis Thoracis.—Formerly done with common trocar and cannula ; now usually with an aspirator. *Position of Patient.*—Sitting up in bed. *Preparation.*—Ascertain by percussion, &c., presence of fluid. Place taps of aspirator in proper position. *Place of Puncture.*—Fifth intercostal space in mid-axillary line, or a lower space more posteriorly, e.g. seventh, near angle of scapula. Both may be tried if fluid do not come through the first. *Operation.*—Insinuate aspirator-needle with a twisting motion over lower rib, close to it (because intercostal artery is near upper rib). Then plunge needle smartly through pleura ; turn cock of aspirator and

¹ See *Med.-Chir. Trans.*, 1888.

collect fluid. Whether it is or is not such a serious matter to admit air into the pleural cavity has been the subject of many papers and speeches. For references, see Neale's *Medical Digest*, p. 240. *Dangers.*—Wounding (1) intercostal vessels, (2) lung, (3) diaphragm ; (4) admission of air and consequent collapse of lung, empyema, &c. (?) ; (5) rupture of pleura or capillaries by excessive suction with the aspirator ; (6) sudden death (see *Med. Times*, vol. ii. 1875, p. 382, &c.). If it is desired to make a *free incision*, this is easily done by cutting along a grooved needle used as a director. Keep close to rib below the space. A *counter-opening* can be made either in the same way as the first, or by the help of a long bent probe or director inserted to be cut down upon.

Paralysis.—Owing to the unsettled pathology, as regards the state of the nervous system, of some of the chief forms of paralysis which come under the surgeon's care, all the forms of paralysis directly concerning the surgeon are noticed under disease of the *muscles*, the affections of which furnish the most prominent symptoms.

Paranephritic Abscess.—Genuine cases are rare. A full description by H. Fischer in Volkmann's *Samml. klin. Vort.* No. 253. Excellent abstract by Van Arsdale, in *Annals of Surgery*, 1885, vol. ii. p. 338.

Paraphimosis. *See PENIS.*

Parotid Tumours, divided, for practical purposes, into (1) innocent, (2) malignant. Former commence near lobe of ear as small hard swellings, perhaps originally enlargements of a lymphatic gland. They are fibro-cartilaginous. Increasing, they tend to grow outwards as a square mass, and inwards so as to displace part or whole of the parotid. But cancerous tumours are more diffuse, more fixed, more painful, increase faster, and tend to infect the lymphatics of the neck. *Treatment.*—A movable tumour corresponding to the first description above given should be excised ; a malignant tumour is fixed, and can rarely be advantageously meddled with. In excising a parotid tumour, cut as much as possible in the direction of the fibres of the facial nerve, and keep the edge of the knife towards the tumour. Simple tumours can sometimes, to a great

extent, be shelled out. Facial paralysis, which sometimes follows these operations, is usually incurable. Remember the size of the vessels embedded in the parotid. Remember also position of Steno's duct, a wound of which may cause salivary fistula.

Patellæ Ligamentum, Rupture of.—Frequency as compared to fracture of patella, about 1-30. *Treatment.*—Suture antiseptically. H. B. Sands writes fully on this injury in *Annals of Surgery*, March, 1886.

Pelvis, Injuries of, are thus classified by Birkett :—1. Contusions involving the soft parts in contact with the outside of the pelvis. 2. Fractures and dislocations of the bones forming the pelvis. 3. Injuries of those organs in relation with the pelvis which are connected with the functions (A) of micturition ; (B) of generation, male and female ; (C) of defæcation. See **BLADDER, RECTUM, URETHRA, PERINÆUM, FRACTURES, &c.**

Penis.—Most common affections are venereal. Others are congenital malformations, usually slight ; phimosis and para-phimosis ; herpes preputii, warts, elephantiasis, cancer, gangrene, priapism.

PENIS, CONGENITAL MALFORMATIONS OF.—(1) **Hypospadias** ; (2) **epispadias** : (3) deficiency of **corpus spongiosum** ; (4) the penis may be bound down to the perinæum, between the testes, so as to arch forward during erection ; (5) adhesion between glans and prepuce.

HYPOSPADIAS.—Urethra stops short on lower surface of penis. Slight degrees common, and of no consequence. If it extends far backwards, *e.g.* so that the urethra opens near the root of the penis, both urine and semen are emitted at right angles to the penis. But even in such cases paternity is not absolutely impossible. Plastic surgery is sometimes successful in such cases (*vide* Wood, *Med. Times*, vol. i. 1875 ; Jordan, *Lancet*, vol. i. 1876). Generally advantageous to establish a temporary perineal fistula during course of operative treatment of defects of penile urethra.

EPISPADIAS.—Urine flows from a groove on upper surface of base of penis. Always combined with extroversion of bladder, *q.v.*

In such a case as 4 (above) divide the adhesion. Congenital

adhesions between prepuce and glans may be torn asunder with any small blunt instrument. With malformations, the following condition may be classed when congenital.

PHIMOSIS.—Prepuce cannot be drawn back. Either *congenital*, or the result of swelling, usually inflammatory and specific, of the prepuce (*acquired*). *Consequences of Congenital Phimosis.*—Local irritation, balanitis, calculous concretions between prepuce and glans. Urinary obstruction and vesical irritation. Masturbation. Reflex convulsions, paralyses, and contractions (Sayre). *Treatment of Congenital Phimosis.*—Circumcise. If circumcision be objected to, success will generally attend steady efforts repeated day by day to draw back the prepuce. *Acquired Phimosis* must be treated according to the indications of each case. Generally rest in bed, cleanliness, and patience suffice in an acute case ; but occasionally it is absolutely necessary to either circumcise, slit up, or forcibly dilate the prepuce. If the prepuce be itself inflamed, it is best to merely slit it up in the dorsal middle line.

PARAPHIMOSIS.—The prepuce behind the glans strangles it, and cannot be pulled forward by the patient. *Treatment.*—1. Success, except in old cases, may generally be expected from Mr. Furneaux Jordan's plan of compressing the penis gently and patiently in the cavity formed by hollowing slightly the palms of the two hands and then opposing them. Soon the oedema yields, and then the paraphimosis is reduced by the fingers and thumbs. The preliminary compression, if gently and patiently done, makes bearable an otherwise intolerably painful procedure. 2. In case of need, the following operation may be done : draw the glans forward, 'then, passing the point of a narrow-bladed scalpel into the sulcus on the dorsum of the penis, make a perpendicular incision about one-third of an inch in length through the integuments at the bottom of the groove directly across it.'—Erichsen. Thus the constricting band is divided.

HERPES PRÆPUTII may be mistaken for chancre. Distinguishable by its extremely superficial character, by the number of vesicles at first, and afterwards by there being nothing to see except excoriation and pus. Lasts a few days. Readily

cured by washing once a day with hot water and dressing with zinc ointment. Patients subject to it should never use soap to the part, but wash daily with water only and dry thoroughly.

PENIS, WARTS ON. *Vide CONDYLOMATA and SYPHILIS.*

PENIS, CANCER OF. EPITHELIOMA.—(Scirrhus is extremely rare.) Usually commences after middle life, on the glans, as a firm warty growth, with a broad base. Its progress resembles that of cancer elsewhere, but it is usually slow, and it seldom infects other organs. *Treatment.*—Thorough excision. Amputation not necessary where a clean sweep can be effected without so radical a measure. When there is sufficient doubt about the *diagnosis*, give a fair trial to antisyphilitic remedies.

PENIS, GANGRENE OF.—Besides the ordinary simple and specific inflammations to which the organ is liable, Humphry instances the following as recorded causes of gangrene : typhus and paraplegia.

PENIS, INDURATION OF CORPUS CAVERNOSUM OF, is said by Verneuil to be sometimes associated with glycosuria. He recommends for it elastic compression.—*Société de Chirurg.*, 1884.

PRIAPIST is rather a symptom than a disease, and points to one of two classes of *causes* : (1) reflex irritation, *e.g.* from gonorrhœa, prostatic disease, and injuries to penis ; (2) paralyses—*e.g.* from injuries to spinal cord.

The penis is liable to many other affections common to the ordinary tissues, and these are frequently mistaken for specific affections. *Phlebitis* occurs occasionally.

PENIS, INJURIES OF.—Chief points in connection with these are that (1) extensive contusion produces priapism, lasting for days ; (2) wounds should be carefully adjusted and united by sutures ; (3) bleeding is easily arrested by cold and pressure ; (4) swelling of the penis in children should suggest the possibility of a string tied round the organ having been hidden by the swelling.

Pericardii Paracentesis. *See PARACENTESIS PERICARDII.*

Perinæum.—Chief affections are abscess and fistula. Hernia and a misplaced testicle in the perinæum occur very rarely.

PERINÆUM, ABSCESS IN THE.—Commonly *caused* by a slight urinary extravasation behind a stricture. *Symptoms*.—At first attention is attracted by fever, perhaps rigors, and pain in the region of the bulb. A hard lump is felt ; this increases and softens. *Treatment*.—Open early ; incise in the middle line. If a stricture co-exist, it is good practice to divide it at the same time (external urethrotomy). At all events the stricture, being the cause of the abscess, must be treated.

PERINÆAL FISTULA.—A result of perineal abscess. Generally closes when the original stricture of the urethra is cured. Perineal fistulæ occasionally have their origin in comparatively remote affections, *e.g.* cancer within the pelvis. In order to cure a perineal fistula, it may be necessary to (1) teach the patient to catheterise himself four times a day, or (2) to incise the fistula freely, or (3) to cauterise it ; (4) it is to be remembered that the presence of a small calculus may prevent healing (Thompson).

PERINÆUM, INJURIES TO.—*Causes*.—Blows received in climbing over railings, &c., or being thrown on the pommel of the saddle. Pressure of child's head in parturition. The injuries vary in seriousness from slight bruises to injuries involving such important structures as the urethra, rectum, and bladder. Parturition may result in—

Ruptured Perinæum.—Varies much in extent. The more extensive ruptures often allow the walls of the vagina, rectum, or bladder, as well as the uterus, to prolapse. The utmost annoyance may be caused by inability to hold the fæces. *Treatment*.—Sutures should be put in at the time when the injury occurs. Otherwise it is, except in trifling cases, advisable to postpone the operation until the child can be weaned and the mother restored to the best attainable health. *Operation*.—Scalpels with short and with long handles, forceps, long and short, strongly curved needles with handles (*e.g.* Baker Brown's needle), sutures of silk, and silver or catgut. Ligatures, artery-forceps, &c. Handled sponges. Duckbill speculum ; retractors. Lithotomy position. Assistant holds duckbill speculum against anterior wall of vagina. Perinæum, &c., shaved. Square flaps of skin and mucous membrane are

marked out on either side of rupture, involving part of the vaginal surface of the recto-vaginal septum, and widening somewhat towards the surface of the perineum. The flaps to be reflected thoroughly, not the slightest bit of mucous membrane to be left. But the flaps need not be removed altogether, should rather be left and sewn together over the vaginal edge of the wound. Pass posterior suture first. It should go through recto-vaginal septum, *i.e.* should never appear in the rupture at all. Suture to enter and leave skin at one inch from edge of wound. Fasten on two pieces of elastic catheter, or else use button suture. When deep sutures are tightened, wound gapes superficially. To remedy this add a few small silver sutures. Buried sutures very useful. Before sutures are tightened stop all haemorrhage. Iced water usually recommended for this. Hot water will sometimes be found to answer better (120° to 130° Fahr.). The haemorrhage will be less if the mucous membrane only, without any of the subjacent erectile tissue, be shaved off (T. Smith). To lessen tension, the superficial fibres of the sphincter ani may be divided laterally; or lateral incisions may be made a short distance outside the external ends of the sutures. Bowels should have been well opened before, and should, after the operation, be kept closed by liq. opii mx . *bis die* for a fortnight. For ten days draw off urine thrice a day with a catheter; and for a week or two afterwards patient should urinate on her hands and knees. Pay attention to the diet. Keep the wound and vagina clean. After washing with an antiseptic lotion, dry carefully and gently. Iodoform dressings.

Periostitis. *Vide BONE.*

Peritoneum. *See ABDOMEN and ABDOMINAL SECTION.*

Phagedæna. *Vide ULCERS and SYPHILIS.*

Pharynx.—Its chief affections are inflammation, abscess, tumours, epithelioma, syphilitic disease, ulceration, wounds, and presence of foreign bodies.

CONGENITAL DISCONTINUITY OF PHARYNX AND OESOPHAGUS.
A complete monograph on this, by Ilott of Bromley, is in *Path. Trans.* for 1876.

ACUTE DIFFUSE PHARYNGITIS.—Highly dangerous. Usually spreads from fauces. Dyspnoea, dysphagia. Great swelling, internal (and often also external). *Progress* rapid. *Termination*.—Usually death, in a few days, either suddenly or with signs of sinking. *Pathology*.—Inflammation of cellular tissue of pharynx and of oesophagus: great oedema; often suppuration. *Treatment*.—Supporting, stimulating. Emetics. Quinine. Laryngotomy, to avert danger of suffocation.

RETRO-PHARYNGEAL ABSCESS.—Most frequent in infancy. *Causes*.—(1) Caries of the cervical vertebræ, (2 and 3) catarrhal and ulcerative pharyngitis, (4) erysipelas, (5) syphilis. Other causes are (6) measles, (7) scarlatina, and (8) traumatic influences. *Signs*.—Fever, dyspnoea, dysphagia. Fluctuating swelling felt on palpation. *Prognosis*.—Specially dangerous in children, because in them it may escape recognition. One or two cases are recorded in which it has opened a considerable blood-vessel and led to haemorrhage. But this accident must be very rare. May open externally in neck. *Treatment*.—Puncture with an abscess knife having its blade, except near the point, protected by lint. Finger may be used as a director. Other measures according to the character and origin of the abscess.

ULCERS OF PHARYNX, usually syphilitic in adults and sometimes strumous in children. *Treatment*.—See Treatment of **SYPHILIS** and **SCROFULA**.

DILATATIONS AND POUCHES OF PHARYNX occur. Food is apt to lodge in them. Diagnose by the history given by the patient. Regurgitation sometimes occurs, or patient may be able to empty the pouch by external pressure. Secondary laryngitis may occur.

PHARYNX, FOREIGN BODIES IN. *Vide* **ESOPHAGUS**.

PHARYNX, VEGETATIONS (ADENOID, &c.) IN. *See* **NOSE**.

Phimosis. *Vide* **PENIS**.

PORRO'S OPERATION. *See* **APPENDIX**.

Pigeon-Breast. *See* **RICKETS**.

Presbyopia.—*See* the **OPHTHALMIC APPENDIX**.

Prostate.—**Chief Affections**.—Inflammation, acute and

chronic ; abscess, periprostatic abscess ; hypertrophy ; simple tumours ; atrophy ; tubercle ; cysts ; malignant disease.

PROSTATE, ACUTE INFLAMMATION OF.—*Causes.*—Gonorrhœa, cystitis, strong injections, cauterisation, mechanical injuries, *e.g.* from sounds. Catching cold, alcoholic excesses, and sexual excitement will determine an attack if some other influence pre-exist, such as gonorrhœa, gout, or rheumatism.

Symptoms.—Local pain extending into loins and back, weight and fulness. Frequent and painful micturition, especially painful at the close of the act. Pain becomes shooting and throbbing. Anal and perineal tenderness and fulness. Defæcation painful. Micturition often difficult or impossible. Fever. Pus in urine when abscess bursts. *Per anum* the prostate can be felt enlarged. Piles may be induced. *Treatment.*—Rest in bed. An aperient to commence with. Antimony. Acetate of potash in full doses. Ten to twenty leeches to perineum and round anus. Hot hip-bath. Poultices to perineum. Retention usually relieved by hot baths and liq. opii. Or a soft catheter may be passed. Prostate remains for a long time afterwards enlarged and hard, obstructing flow of urine. Ol. santalini in gonorrhœal cases.

PROSTATE, CHRONIC INFLAMMATION OF.—Usually a sequel of acute. Generally, but not always, enlargement of the gland. Obstruction to passage of urine. Anal and perineal pain. Gleety discharge. Sometimes nocturnal emissions. Pain in sexual intercourse. Irritable bladder. *Treatment.* Rest. Regular and unstimulating diet. Tonics and stomachics. Iron, with a mild aperient. Counter-irritation to perineum. For the nocturnal emissions, make three or four applications of a solution of nitrate of silver (gr. x.—xxx. to $\frac{3}{4}$ j.) to the prostatic part of the urethra. As Sir H. Thompson says, ‘to be successful an efficient instrument is absolutely necessary, as well as care in injecting the fluid at the right spot.’ For enlargement of prostate left by acute inflammation give a prolonged course of pot. iod. and pot. bromid. ; sea-bathing and tonics.

PROSTATIC ABSCESS.—1. *Acute.*—When prostatitis leads to abscess, the acute symptoms persist for more than a week. ^{or}

two, pain and tenderness increase, rigors probably occur, and the prostatic swelling may throb. Fluctuation may be felt sooner or later, perhaps *per rectum*. Abscess tends to open into urethra, more rarely into rectum. Either termination is of good prognosis. In exceptional cases abscesses recur again and again. *Treatment.* Incise early in the median line of the perineum. Foment and poultice. 'When the suppuration is due to stricture, and probably extravasation, the propriety of dividing the stricture and laying open the perineum down to the prostate cannot be questioned' (Bryant). 2. *Chronic Prostatic Abscess.* Either a sequel of acute abscess or the direct result of old stricture of urethra. Whole prostate may be destroyed. Condition always serious. Chronic cystitis, progressive emaciation. *Treatment.*—Rest, highly tonic and soothing regimen, fresh air. Sometimes perineal incision is indicated.

PROSTATE, HYPERSTROPHY OF.—A senile affection. Never occurs before fifty, usually over sixty. But, of old men, it attacks about one-half. Affects every constituent, but chiefly the muscular and fibrous elements. Enlargement, general or limited. In the latter case, an outgrowth sometimes occurs from the centre of the gland backwards towards the bladder, improperly called the 'enlarged third lobe.' Either lateral lobe may be disproportionately hypertrophied. Isolated, almost independent tumours (myomata) are very common in the substance of hypertrophied prostates. They contain very little glandular substance, and that ill-developed. *Effect on the Urethra.*—Prostatic part of urethra is lengthened, and its antero-posterior diameter increased, while its transverse diameter is lessened. Its direction is altered in a manner which varies according to the part of the gland which is enlarged. The urethra takes an abnormal curve whose concavity corresponds to the lateral lobe most enlarged. So also the vesico-urethral orifice takes a crescentic form with the concavity towards the enlarged lobe. When the 'third lobe' is enlarged, the urethra is bent suddenly upwards in front of it. Occasional outgrowth of median portion of prostate, overlapping vesico-urethral orifice as a valve, which obstructs the

flow of urine. *Size* of enlarged prostate often very considerable. Diameter of over four inches and weight of twelve ounces known. A weight of even one ounce signifies hypertrophy. Consistence varies. *Symptoms*.—(In earliest stage *nil*.) Diminution of force with which urine is ejected. Frequent desire to micturate ; micturition is, as it were, incomplete. Uneasiness and weight about perinæum and neck of bladder. Tenesmus. Hæmorrhoids tend to develop. Sometimes flattened stools. After a time chronic cystitis. Sometimes urethral discharge, or frequent erections of penis. Urinary obstruction increases ; bladder overflows at night. Bladder-dulness tends to ascend higher and higher in abdomen. General health gets worse. Accidental circumstances, *e.g.* slight excesses, bring on attacks of retention. Small hæmorrhages. Urinary changes similar to those of chronic cystitis. Neutral or alkaline reaction. Mucus. Phosphatic masses, soft and white. Muco-pus. *Diagnosis* is usually determined by examination with the left forefinger in the rectum. Information may be thus acquired concerning the size, shape, and consistence of the prostate, and concerning the presence, absence, or position of fluctuation. Such examination is assisted by simultaneously manipulating a catheter in the urethra. 'If the catheter has passed easily, say for nine or ten inches, and still no urine flows ; and if, in addition, while following its course, the handle has become more than usually depressed, there will be little doubt in respect of the existence of prostatic enlargement' (Thompson). When the catheter is deflected laterally in passing, the side *towards* which the handle turns is probably the more enlarged. An examination should be made with a short beaked sound, such as that pictured in Holmes's *System*, vol. iv. p. 926 ; or one of those described and illustrated by Teevan in the *Lancet*, vol. i. 1880. With this a possible calculus should be searched for. *Stricture of Urethra* contrasts with prostatic obstruction, in that (1) it occurs anteriorly to prostatic urethra, (2) it appears before middle life, (3) the stream of urine is more diminished in volume (in prostatic obstruction it is rather force than volume which is lessened). Other conditions from which prostatic enlargement has to be distinguished (though it may co-exist with

them) are *vesical calculus, tumour of the bladder, atony of the bladder, paralysis of the bladder*. Compare with the symptoms of these given under DISEASES OF THE BLADDER. *Treatment.*—A catheter should be passed twice a day, oftener where urination is extremely feeble. But see end of section on 'Stricture of Urethra' for an account of the dangers of catheterism. Keep the patient indoors, warm, and at rest during commencement of treatment. Patient should learn to catheterise himself. Elastic instruments preferable. Silver prostatic catheters are either made with a large curve or else with a short beak. Great irritability of the bladder, disturbing sleep, may require a vulcanised india-rubber catheter to be tied in all night. Treat coincidently such complications as catarrh of the bladder (*quod vide*). Attend to the general health and regulate the habits. Clothe lower limbs warmly. Supra-pubic puncture of bladder for obstruction due to enlarged prostate. See T. Smith's article in *S. B. H. Reports*, 1881. If the tube has to be left in, the patient can learn to manage it himself. See also *Prostatectomy*.

If, in the performance of a lithotomy on a patient with enlarged prostate, isolated growths be felt, they should be enucleated with the finger (Fergusson); and if a pendulous growth, such as is sometimes the condition of the 'third lobe,' it should be removed. (See R. Harrison, *Med.-Chir. Trans.*, 1882.)

PROSTATE, ATROPHY OF.—Unusual and unimportant.

PROSTATE, MALIGNANT DISEASE OF.—*Encephaloid* is the form which affects this gland. Occurs only in childhood and in advancing age. Progress very rapid in children. The symptoms are the usual ones of cancer, added to those of prostatic obstruction, including, especially, severe pain, occasional haemorrhages, and cachexia. Lymphatic glands of lumbar, and sometimes of iliac region, enlarge. Urinary deposit may exhibit cancer cells when examined. *Treatment.*—If catheterism cannot be avoided, be as gentle as possible. Anodynes, &c. Treat haemorrhage on general principles. Support the general strength.

PROSTATE, TUBERCLE OF.—Very rare. Always secondary. Symptoms probably raise a suspicion of calculus; but no stone being found, and coincidence of symptoms of tubercle elsewhere,

correct the diagnosis. Avoid instrumental interference ; protect from other sources of irritation ; and treat the tubercle and its results—*e.g.* abscess—on general principles.

PROSTATE, CYSTS OF.—Small cysts sometimes occur. Often numerous ; often contain small concretions. Probably dilatation of gland-tubules. No known symptoms of consequence, therefore no *treatment*.¹

PROSTATECTOMY.—An operation by which a piece of the prostate is punched out in order to clear the way for the urine. The instrument used is much like a lithotrite, but the male blade has a cutting edge instead of a crushing surface.

Psoas Abscess. *See SPINE, CAVITIES OF ; also ABSCESS, CHRONIC.*

Psoriasis.—A ‘squamous’ disease of the skin, always chronic, often recurrent—especially in spring and autumn—often syphilitic, sometimes hereditary. The sufferers are, for the most part, in perfect health, except when syphilitic. Infants and very old people are almost exempt. Psoriasis is a superficial dermatitis, without sub-epidermic effusion, *i.e.* without causing vesicles. It forms red spots or patches, covered with white, shining (epidermal) scales. The classification of psoriasis into many varieties is of little more than nominal importance, *e.g.* psoriasis guttata, psoriasis diffusa, psoriasis circinnata (formerly ‘lepra vulgaris’), psoriasis nummularis, psoriasis palpebrarum, psoriasis scrotalis, psoriasis palmaris, psoriasis plantaris, &c. *Diagnosis of Syphilitic from Common Psoriasis.*—Syphilitic is (1) generally darker in colour, (2) rarely affects knees and elbows, (3) is frequently palmar and plantar—the latter is always syphilitic, (4) may lead to painful fissures, and even ulcers. Non-specific psoriasis has for its favourite seats the extensor sides of the knee and elbow ; because there the skin is coarse and dry. Of course, the history may be inquired into. *Treatment.*—Vigorous external treatment, and arsenic internally. Begin with two Turkish baths, or several warm baths, using plenty of soft soap. Locally, prefer *ung. picis.* Olive oil, in conjunction

¹ The above account of diseases of the prostate is chiefly condensed from the writings of Sir Henry Thompson.

with repeated baths, may suffice. Crocker recommends thymol ointment (gr. x.-xxx. to $\frac{3}{2}$ j.). Ung. acidi chrysophanicis (gr. xx. to $\frac{3}{2}$ j.) (liable to stain linen). Begin with three minimis of liq. arsenicalis three times a day, and gradually increase to six minimis. *NOTE*.—Arsenic first appears to aggravate the disease. Give it *after* meals. Other internal remedies are tinct. cantharidis and iodide of potassium (gr. x. doses).

For syphilitic psoriasis, rely mainly on ordinary anti-syphilitics.

Pyæmia.—A disease characterised by remittent fever (not intermittent) and the formation of multiple collections of pus in various parts of the body. It is a near ally of septicæmia and of ordinary surgical fever ; but the scattered abscesses are characteristic. *Causes.*—The immediate cause is granted to be the absorption of pus or of septic material into the blood. It is still uncertain whether the immediate cause of pyæmia can be absorbed through the mucous membranes, or whether it can enter only through an open wound. Advocates of the germ theory suppose that almost every case of pyæmia is due to the entrance of microscopic germs into open wounds, and produce strong experimental proof of that belief ; but how those germs cause the multiple abscesses is not so clear. The immediate cause of each scattered abscess ('metastatic' abscesses they are often called) is venous thrombosis and embolism ; but what is the exact way in which the thrombosis is brought about ? Some of the abscesses near the original wound are merely terminations of lymphatic inflammations, a track of inflamed lymphatics being sometimes traceable to them from the wound. Cases of pyæmia sometimes occur apparently spontaneous in origin, and are called 'idiopathic pyæmia.' It must be remembered that their idiopathic nature rests on negative evidence only.

Conditions predisposing to Pyæmia are (1) bad ventilation and foul air ; (2) accumulation of many wounds in one ward ; (3) neglect of having sick-rooms thoroughly and periodically cleansed ; (4) dirty and careless dressing and nursing ; (5) unnecessarily meddling with and disturbing injuries ; (6) bad

drainage, (7) other analogous conditions. A second set of causes belong more personally to the patient. They include (1) drunken habits, (2) old age, (3) weak constitution, (4) unmanageableness and restlessness. Many slight cases of feverishness have been converted into acute blood-poisoning by severe exercise, *e.g.* ascending a mountain. 'You will find in every day's practice that fatigue has a larger share in the promotion or permission of disease than any other single causal condition you can name' (Paget). 'After wounds, children are singularly free from pyæmia' (Paget). *Pathology.*—The nature of the changes in the blood is unknown. Localities attacked are (1) joints, (2) viscera, (3) serous membranes, (4) mucous membranes, (5) skin ; and to these may be added the veins, lymphatics, and cellular tissue throughout the rest of the body. In the viscera are found low inflammations and metastatic abscesses. The affected joints and serous cavities are inflamed and filled with pus. External to the joints are œdema and flushes of redness. The affected mucous membranes are inflamed, and may give vent to great discharge. This, in the case of the gastro-intestinal canal, causes diarrhoea and even vomiting. When the skin is affected, blood-poisoning usually shows itself as erysipelas, a disease specifically distinct from pyæmia, or as pustular inflammation. Veins become the seat of thrombosis, with or without precedent inflammation. Jaundice and suppression of urine sometimes occur in the course of pyæmia.¹ *Symptoms and Course.*—1. Of *Acute Pyæmia* : rigors and feeling of illness. Perhaps purging and vomiting, with or without jaundiced hue of skin. High temperature. Rapid and frequent pulse. 'Erysipelatoid' inflammation of neighbourhood of wound. Tender and inflamed glands. Acute pneumonia or pleurisy. Finally, 'the patient—flushed, anxious, restless, even delirious, —is in a hopeless condition, with prostration and rapid sinking.'² Duration : about five or six days. 2. *Sub-acute or Chronic Pyæmia.* A typical case presents, successively, the following symptoms :—wound dry and inflamed, its edges swollen. This

¹ For a lucid and fair *r  sum  * of the facts known and chief theories advanced about pyæmia, see Pepper's *Surgical Pathology*.

² Callendar in Holmes's *System*.

local inflammation spreads. Pain and tenderness ; burrowing of pus ; fever ; rigors ; abscess forms near the wound ; neighbouring joint swells ; other abscesses form. Large lymphatics and glands may inflame and suppurate. Fever continues ; temperature rises and falls irregularly, high rises usually coincident with rigors. Distant joints swell. Progressive emaciation ; yellow skin ; no sleep ; no appetite ; despondency. Cough ; pain in chest (indicating pleurisy or metastatic pneumonia). Tongue furred and dry. Bed-sores. Occasional delirium. Eyes dull. Finally, utter prostration and death. Duration of sub-acute pyæmia, two to four weeks : of chronic, one to five months. *Prognosis.*—Of acute cases, practically hopeless. Chronic and mild cases may recover, especially if prime cause can be removed. Something also depends upon the position and extent of the suppuration foci. Paget relates a case which lasted three years and finally recovered. *Treatment.*—Chiefly prophylactic. It includes the whole art of treating *wounds* properly (*quod vide*). Cleanliness, quietness, &c. Antiseptic treatment, drainage, rest, &c. Hospitals properly situated, arranged, and ventilated ; wards periodically cleansed and disinfected ; clean bedding ; obedient and sensible nurses. When pyæmia is actually developed, plenty of fresh air, diligent nursing, feeding with milk, eggs, &c. ; cooling drink ; quinine (5–15 grains for a dose) ; morphia at night ; hyposulphite of soda (gr. xx. every two hours) ; warm baths and wrapping in blankets to produce copious diaphoresis. In chronic pyæmia amputation may be indicated. *Liq. potassæ* (*3j. ter die*) to remove pyæmic deposits (Paget).

Pylorus, Excision of.—Up to the end of 1882, partial gastrectomy had been done 29 times, 4 patients only surviving, the rest dying before the 9th or 10th day. But in many of the fatal cases the patient was in a very worn-out and unfavourable condition ; 27 were cases of tumour, 2 of chronic ulcer. Both the ulcer cases recovered. Péan first excised the pylorus. But Billroth and Wölfler were the first to do so successfully. Three forms of excision, (1) parallel to right costal margin, (2) transverse, (3) vertical, in or near linea alba. Antiseptic precautions. Frequently adhesions cause great

difficulty. As a rule, divide them between double ligatures. But they may involve *vena portæ* or even *vena cava*. Affected glands should be removed. Stomach opening often too large to fit duodenum. It may be partially sewn up, or the duodenum may be cut obliquely to obtain a larger border, or both stomach and duodenum may be closed and a passage made for the food by means of *gastro-enterostomy* (*q.v.*). Aseptic animal sutures—very numerous, even 50 or 100. Feeding, rectal at first; from second day a little fluid per mouth; solid food on eighth day (in Czerny's successful case on the fifth). See *Trans. Intern. Med. Cong.*, vol. ii.; Billroth's *Clin. Surgery*; *Lancet*, March 24, 1883, p. 505. For a very complete account of a typical *pylorectomy*, described in great detail, with diagrams, refer to Southam, *Brit. Med. Journ.*, July 29, 1882.

Quinsy. *See TONSILS.*

Rabies. *See HYDROPHOBIA.*

Rachitis. *See RICKETS.*

Ranula.—A cystic tumour occurring in two situations, (1) close by *frænum linguæ*, (2) between *mylo-hyoid* muscle and mucous membrane. The latter form of ranula bulges externally between chin and hyoid bone. Contents: glairy, mucous fluid. But the second form may contain matter of a cheesy consistence. *Causes.*—Ranulas are probably 'retention cysts,' but not caused by obstruction of Wharton's duct (Morrant Baker). *Treatment.*—Open in the mouth, and cut away a part of the cyst-wall. Empty, and if the fluid re-collects, repeat the operation, in addition cauterising the interior of the cyst.

Raynaud's Disease.—In patients subject to this affection the attack usually occurs in cold weather. Livid patches are seen, which may recover or pass into gangrene. The cause is stated to be spasm of the arterioles. Raynaud recommends the use of the constant current down the spine. For cases, see *Clin. Soc. Trans.*, 1883.

Rectum, Diseases of (for those of *Anus*, *vide ANUS*).—Stricture, cancer, polypus, malformation, *hæmorrhoids* (*vide HÆMORRHOIDS*).

Patients with rectal disease are apt to call the surgeon's attention only to distant symptoms, and to say nothing about, or even know nothing about, the local trouble. This should be borne in mind in cases of anæmia, sciatica, irritable bladder, &c.

RECTUM, STRicture OF.—Two kinds, viz., *Simple* and *Cancerous*. For latter, *vide CANCER OF RECTUM*.

SIMPLE STRicture.—*Causes.*—(1) Contraction of simple inflammatory deposit in the walls of the rectum ; (2) syphilis ; (3) cicatricial contraction after operative procedures ; or (4) after sloughing, caused by pressure during parturition ; or (5) after strumous, dysenteric, or other ulceration. The chronic inflammation which leads to stricture may be caused by the impaction of foreign bodies or by the constant irritation of hard faeces.

Pathology.—The seat of a simple stricture is marked by a fibrous deposit, which may extend wholly or partially round the bowel. When slight, it lies usually in the submucous tissue ; but often the whole thickness of the rectum is affected. The usual seat is from one inch to one inch and a half above the anus. Bowel above stricture dilated and hypertrophied. Secondary abscesses and fistulæ often form, as in case of stricture of urethra.

Signs.—(1) Constipation, (2) burning pain on passing a stool, (3) straining at stool, (4) blood or mucus in stools, (5) patulous anus, (6) 'tape-like' motions, (7) detection of a stricture by digital examination or by a bougie. The 2nd, 3rd, 4th, and 5th signs mark the ulcerative stage ; the 6th sign is not thoroughly reliable. Examine very gently, especially if using a bougie. Roughness may do fatal damage. Do not mistake for stricture, obstruction caused by mucous folds or by pressure of pelvic tumours. Sooner or later the constipation ends in complete obstruction, which may come on with great suddenness. In advanced cases the general health breaks down under the influence of pain, dyspepsia, and anxiety.

Treatment.—The prime agents are (1) dilatation by bougies, (2) incision. The latter is suited only for traumatic strictures close to the anus. Accessory means are, rest in bed, warm water enemata, regulated diet, morphia suppositories, and hip baths. Oil the bougies well, pass them every other

day, gradually increasing the size. Patients, when cured, should continue to pass bougies or wax candles for themselves, either weekly or bi-weekly, or even daily, as may be found necessary. When complete obstruction occurs, try rest, warm hip-baths, warm, oily enemata, and purgatives. The surgeon should not be in a hurry to operate, for these cases may relieve themselves after weeks of obstruction. The last resource is colotomy. When the stricture is high up, give the enemata through the long tube.

RECTUM, CANCER OF.—Usually *scirrhus*. *Pathology*.—Originates in proliferation of the glands of the mucous membrane. These 'grow in the shape of tortuous and branched tubes ; the calibre of the gland is often maintained ; and they fill with mucus, and the cylinder cells may maintain this form and become very large.'—Billroth. The infiltration and induration tend to surround the rectum with a hard ring. 'Leaf-like proliferations commence close above the sphincter ani.' Ulceration. 'Inguinal and retro-peritoneal glands affected rarely and late.' Ulceration may lay open bladder, urethra, vagina, peritoneum, hip-joint, &c. *Symptoms*.—At first, discharge of bloody mucus, and either constipation or diarrhoea. Other early symptoms are pain in thighs and in bottom of back. Defæcation becomes more and more painful. Haemorrhage becomes more serious. Digital examination usually reveals the hard, nodular ring, and perhaps ulceration. *Diagnosis*.—At first from haemorrhoids, a little later from simple stricture. Usually settled by digital examination. *Treatment*.—1. Palliative ; 2. Radical. 1. *Palliative*.—Anodynes, e.g. morphia suppositories ; afterwards, morphia subcutaneously or by the mouth. Sometimes gentle aperients, warm water enemata. Enemata of cupri sulph. and opium, or of zinci chlor. (gr. j.-ij. ad 3j. aquæ) may check foul discharges. Obstruction or extreme pain in defæcation may demand colotomy. 2. *Radical*.—Excision of rectum for cancer has often been condemned, on account of the risk of dangerous haemorrhage, of opening the peritoneal cavity, and of cellulitis. But there are good reasons for taking an opposite view, e.g., the neighbouring glands are not secondarily affected at an early stage : and,

according to Volkmann, the chief dangers of the operation are avoided by strict attention to special antiseptic precautions. See next article. The usual limiting rule as to extent of disease fit for extirpation is that the finger shall be able to get beyond it, and that it shall be apparently non-adherent to neighbouring parts. Cripps discusses this question ably. But it is certain that the answer must depend greatly on the surgeon's confidence in himself and in antiseptic surgery.

RECTUM, EXCISION OF.—Thoroughly empty bowel. Incision round anus and back again, in median line to coccyx ; forward also in median line if necessary. To give more room in high operations Verneuil excised the coccyx. Dissect upwards on the outer aspect of the rectum to well above the disease, using scissors and fingers rather than the knife. Sound in male bladder ; finger in vagina if patient be female. Draw rectum well down. Customary at this stage to cut into rectum in median plane behind ; perhaps better not to. Pass ligatures through bowel above tumour before removing latter (Velpeau). Use Wells's forceps temporarily for bleeding vessels. If peritoneal cavity be opened protect it with an antiseptic sponge, and finally close it with ligature or suture. Nussbaum has even removed parts of the bladder, prostate, and urethra in a case which recovered. Use strictly antiseptic measures ; two or three drainage-tubes. Volkmann keeps up constant antiseptic irrigation for three or four days, and afterwards injects the wound daily. He brings the rectum down and sutures it to the skin wound immediately after the excision. Most English surgeons do not seem to have been able to keep these sutures, perhaps owing to want of thoroughness in antisepticism. Kraske has worked out successfully the problem of removing the highest part of the rectum for cancer. See *Centbl. f. Chirurg.* 1885 (Congress of German Surgeons).

RECTUM, POLYPUS OF.—Usually occurs in children, is adenomatous in structure, apt to signify its presence by occasional haemorrhages, and may be snipped off with scissors, a ligature having been previously applied.

RECTUM, INJURIES OF.—*Causes.*—May be classed as follows:

(1) falls on sharp-pointed objects, *e.g.* spikes ; (2) sharp bodies swallowed, *e.g.* fish-bones ; (3) objects wilfully inserted ; (4) obstetric processes ; (5) surgical operations on neighbouring parts. The first class usually recover thoroughly, unless fatal through complication with injury to more serious parts, such as the peritoneum. The causes of the 2nd and 3rd class require immediate removal with the aid of fingers, forceps, speculum, plenty of oil, &c. The 3rd and 4th class of cases are apt to produce troublesome fistulæ. They should be treated with as little delay as possible. *Vide VAGINAL FISTULÆ.*

RECTUM, MALFORMATIONS OF. *Vide ANUS, IMPERFORATE.*

Renal Affections. See 'Kidney,' 'Nephrectomy,' &c.

Rheumatism.—A name applied almost indiscriminately by the public to painful non-traumatic affections of the joints and muscles, more especially when chronic. The disease called 'rheumatic gout' chiefly concerns the surgeon. He terms it—

Chronic Rheumatic (or Rheumatoid) Arthritis.—*Causes.*

—Predisposing influences are malnutrition, poverty, approach of old age, male sex. Exciting cause usually unknown: sometimes injury, or disordered menstruation. *Symptoms.*—Pain in the affected joint, aggravated by wet or cold weather and by exercise. Stiffness. Wasting of muscles which act on the joint, *e.g.* of glutei and hamstrings in chronic rheumatic arthritis of hip. Dry crepitation when the joint is moved. Eventually, more or less enlargement of the bones of the articulation. Thickening of the ligaments. Stiffness may proceed to ankylosis. When the *hip* is affected shortening takes place sooner or later from absorption of head of thigh-bone. Pelvis becomes oblique; foot is either everted or inverted. When the *temporo-maxillary joint* suffers, dislocation of one or both sides of jaw forwards may result from destruction of *eminentia articularis*. *Prognosis.*—Progress of disease usually not uniform, but effected by recurrent attacks with intervals of comparative comfort. But, unfortunately, the joints do not return to the normal state in these intervals. Recovery almost impossible. No direct danger to life. Billroth says: 'When you have such a patient to treat, arm yonrself with patience, and be not surprised if he consults first one, then

another physician, and finally all the quacks about, and, lastly blames you for the origin and extent of his disease.' *Diagnosis*—From (1) scrofulous arthritis, (2) gout, (3) dislocation from injury. Compare with symptoms as given elsewhere. Particularly consider history and course of disease, as well as age and circumstances of patient.¹ *Pathology*.—Begins by a fibrillous degeneration of the cartilages. 'In some cases it becomes nodular, then rough on the surface, may be pulled into filaments, and when the disease is far advanced it is altogether absent in places, leaving the bone exposed, quite smooth and polished.'—(Billroth.) Cartilage-cavities enlarged and containing increased numbers of new cartilage cells. The bone, devoid of cartilage, compact, and polished by friction, is termed 'eburnated.' 'Stalactitic' formation of osteophytes in immediate neighbourhood of above changes. Bone being absorbed in one place and formed in another, situation of a joint may shift considerably. Synovial membrane thickened, slightly vascular, tufts elongated. Separate ossifications near the joint (additimentary bones). New bone always compact. Muscles of affected joint tend to contract. Joints tend towards a state popularly described as 'drawn up'; witness rheumatic fingers of old people. *Treatment*.—Meant rather to arrest or to palliate than to cure the disease. Improve the diet. Remove from wet and cold localities. Clothe in flannel. Frictions with stimulating liniments. 'Massage.' Douching with alternately very hot and cold water. India-rubber bandages. Combinations of warm stomachics, diaphoretics and mild purgatives, *e.g.* rhubarb, ginger, sulphur, mezereon, sassafras, guaiacum, cream of tartar, &c. Iodide of potassium, especially when pain is worse at night. Chloral and pot. bromid. when pain is very severe. *Actaea racemosa* (15 to 30 minims of tincture three times a day). Residence at certain watering-places, *e.g.* Buxton, Harrogate, and Aix-la-Chapelle. Leather or even plaster of Paris supports useful in some cases of rheumatic knee-joint. Treat menorrhagia if present.

Rhinoscopy.—Examination of nares by aid of laryngeal mirror turned upwards in pharynx. Difficult. *Natural causes*

¹ See 'Joint-disease, Charcot's.'

of difficulty.—1. Irritability of pillars of fauces, and of posterior wall of pharynx. 2. Enlarged tonsils and uvula. 3. Insufficient distance between uvula and posterior wall of pharynx. *Rules.*—Same as those for *Laryngoscopy* (*quod vide*), up to rule 6. Rule 7. Allow patient's tongue to remain at rest and untouched in the mouth. 8. Hold mirror like a pen and with the reflecting surface upwards. 9. Let its shank rest lightly on the dorsum of the tongue ; but be very careful not to touch the base of the tongue. Shift the mirror slightly to right or left of uvula, according to which side it is desired to examine. 10. Direct patient to exhale quietly and continuously by the nostrils.

Rickets.—Rachitis. A disease of early childhood manifested chiefly by abnormal softness of the bones and consequent deformity, and by backward development of the teeth. *Causes.*—Improper feeding in infancy, especially giving young infants farinaceous food to supplement a scanty supply of milk. Other bad hygienic conditions probably assist. The disease can be produced artificially in puppies. It sometimes attacks the foetus in utero, which may then, when born, show signs of numerous fractures. *Signs.*—At first the little patient often has diarrhea. He shrinks from being touched ; for movement is painful. Head perspires. Kicking off bedclothes at night. Backward dentition. Laryngismus stridulus. Emaciation. The above symptoms are entirely or partially absent in older children. Disease usually commences in second year. The infant ceases to walk when disease is at its height. Deformity of chest (pigeon-breast) now takes place. Bow-legs, knock-knees, curvature of spine (lateral and antero-posterior), as well as, though more rarely, pelvic deformities, occur when the patient walks about again. 'Beading' of junctions of ribs with costal cartilages. Enlargement of wrists, knees, and ankles. Fortanelles remain open. Head grows too fast, face too slowly ; hence projecting brows. Large bellies ;¹ frequently enlargement of liver and spleen. Bronchitis. The subjects of rickets in childhood do not, in later life, attain normal height. *Pathology.*—Mineral constituents of bone not deposited

¹ An early sign of great value (Clement Lucas).

in normal amount ; but animal portions grow normally. Hence the bones soften, lacunæ enlarge, periosteum and epiphysial cartilages proliferate ; and, as ossification does not keep pace with this, long bones are apt to bend beneath the weight of the body, especially at the junction of their epiphyses with their shafts. It must not be supposed that the bones bend mechanically, as would a long thin rod of soft metal. The bending is a process of growth, of interstitial increase on the side of least pressure, and of arrested growth or even absorption on the side of greatest pressure. Moreover the word 'soft' is applied to rickety bones in a way calculated to convey a wrong idea. However impressionable in the way just mentioned, they are not always physically soft. Moreover, the modifications of growth which result in changes of shape do not take place indiscriminately all over the bone, but chiefly at and near the so-called 'epiphysial cartilages.' (The diaphyses rather than the epiphyses are developed from these.) For similar reasons the growing brain forces apart the cranial bones and keeps open the fontanelles. The changes near the epiphyses account for the beaded ribs, the enlarged wrists, and the deformed knees and shins. Also general thickening, with partial thinning of cranial bones. When the rachitis disappears, leaving a bent long bone, the concavity of the curved bone is eventually strengthened by deposit of a ridge of compact bone. Rachitic pelvis are usually flattened antero-posteriorly. Femora curve forwards. Tibiæ and fibulæ usually bend forwards and outwards (chiefly at junction of lower epiphyses). Spine affected with general posterior curvature in early infancy, with lumbar lordosis in early childhood, and occasionally with lateral curvature. Thorax—'pigeon-breasted.' *Diagnosis.*—Quite easy except in early stage. *Prognosis.*—Sometimes fatal to very weakly infants. Recovery usual, but rarely without residual deformity. *Treatment.*—Correct diet. Plenty of milk. Sufficient animal food. Cod-liver oil. Syrup of phosphates of iron and lime. Parrish's chemical food. Vinum ferri. Cold sponging and dry rubbing. Fresh air. Splints and other mechanical contrivances to correct deformities. In severe cases, osteotomy, or forcible

straightening of limbs under anaesthesia. Keep a young rickety child off its feet as much as possible without depriving it of fresh air and exercise. It should sleep on a mattress.

Ringworm. *See HERPES CIRCINATUS*, p. 228.

Sacro-Iliac Disease.—*Causes.*—Either struma or injury, or both together. *Symptoms.*—Local pain and tenderness. Pain during defaecation, sometimes also during micturition. Peculiar posture (*vide* figures in Sayre's *Orthopædic Surgery*). Patient bends his body over from the affected side, 'for the purpose of removing pressure from the diseased structures by bringing the weight of the limb to bear upon the ilium.' Hence obliquity of the pelvis and apparent lengthening of limb on side of disease. When abscess forms, it may appear either over the articulation, or in the buttock, loin, groin, or even rectum. *Diagnosis.*—From neuralgia, sciatica, Pott's disease, and from hip-disease. In sacro-iliac disease, if the pelvis be firmly fixed, the hip-joint can be moved normally and painlessly. In sufficiently advanced cases, the pelvis can be seen to be deformed ; and when abscess has opened, a probe will often reach dead bone. Sayre's vertebrated probe may be useful. When pelvis is not fixed, either lateral compression of trochanters or abduction of thigh causes pain. *Prognosis* bad. *Treatment.*—Rest, extension and counter-extension. Sayre puts a thick-soled shoe on the foot of sound side so that the affected limb swings free of the ground when the patient moves out of doors on crutches. Before suppuration takes place, use counter-irritation, especially the actual cautery. Dead bone, if detected by probe, should be removed, if possible. Indeed this joint being accessible, its affections should be treated on the same principles as those recommended for the joints of the limbs. Cod-liver oil, iron. High, dry, and healthy localities.

Salivary Calculus.—A concretion sometimes obstructs a salivary duct. Slit up the duct, if necessary, and remove it. May cause swelling of gland. Ducts usually affected are the sublingual or submaxillary.

SALIVARY FISTULA (1) from totally obstructed duct. *Treatment.*—Establish an opening into the mouth by passing a seton

right through the fistula into the mouth and tying its two ends together. Part of the cheek is thus, of course, enclosed in the loop. When an opening into the mouth is thus kept open for ten days, endeavour to close the external opening by cauterisation, unless it close spontaneously. (2) When the buccal end of the duct is permeable, catheterise. 'So much difficulty attends the passing of a probe into the buccal opening of Stenson's duct, that I advise a surgeon who may divide the canal during an operation to pass a pewter wire (No. 16 b. w. g.) through the divided end of the distal portion into the mouth before closing the wound.'—Thornley Stoker. This wire is to be left in several days. See *Dub. Med. Journ.*, vol. i. 1882. (3) Salivary fistula from abscess in a gland is difficult to cure. Try cauterisation. Or, thoroughly scrape the fistula, removing every vestige of granulation, and attempt to close it with one or more sutures, passed in deeply.

Sarcocele. *See TESTICLE.*

Sarcoma. *See TUMOURS.*

Scalp, Injuries of. *Vide HEAD.*

Scarlatina not unfrequently complicates the after-course of operations on children. It appears to differ little from ordinary scarlatina, provided only that the little patient escape coincident septicaemia. If anything, it is less dangerous than ordinary scarlatina. The subject has been extensively treated of late years in the journals and hospital reports, and at the Societies,¹ by Messrs. Marsh, Howse, Edmund Owen, &c.

Sciatica.—Neuralgia of great or of less sciatic nerve.

Causes.—(1) Catching cold, (2) pressure of hardened faeces in rectum or of pelvic tumours, (3) peripheral irritations, e.g. inflamed corns, (4) many cases are of quite obscure origin. Always bear in mind that sciatic neuralgia may be only a sign of some more serious disorder. *Diagnose* from hip and from sacro-iliac disease. *Treatment.*—*Vide NEURALGIA.* In obstinate cases try cautery (Corrigan's button) or even 'nerve-stretching.' Acupuncture. Purgatives, quinine. Iodide of potassium. Morphia injections. Blisters. Electricity. For *Pathology*, &c., of Sciatica, *vide NEURALGIA*.

¹ Also at the International Congress, London, 1881.

Scrofula.—This term and its synonym ‘*struma*’ have been used to express the idea of a diathesis rather than that of a disease. The characteristics of this diathesis (if it may really be so called) are neatly given by Billroth as follows: ‘Exists chiefly during childhood, though more advanced ages are not free from it.’ ‘Persons with this diathesis, especially children, are greatly disposed to chronic inflammatory swellings of the lymphatic glands, even after inconsiderable irritations, to certain inflammations of the skin (eczema, impetigo), especially of the face and head, to catarrhal inflammations of the mucous membranes, especially of the conjunctiva, more rarely of the intestinal canal and respiratory organs, to chronic inflammations of the periosteum, and of the synovial membranes of the joints.’ If we give due weight to the observations and arguments of Koch and others, we shall regard the above-named local lesions as being due to the direct influence of the tubercle bacillus. It becomes then a question whether we have not been in the habit of using the words ‘scrofula’ and ‘*struma*’ in a vague and not quite consistent way, as meaning sometimes a mere tendency to be troubled with a disease essence (so to call it), which we now know to be the tubercle bacillus, and sometimes, on the other hand, an actual state of suffering therefrom. The use of the words in question is a practice which cannot at present be either easily or usefully given up. However, in view of the uncertainty and want of knowledge respecting what class of persons, if any, are very specially predisposed to be infected with tubercle, I have throughout this work, used the words ‘scrofulous’ and ‘strumous’ as signifying actually infected with the tubercle bacillus.

Causes, Pathology, Symptoms, Diagnosis, Prognosis, and Treatment.—See under heads or **TUBERCLE**; **GLANDS**, **CHRONIC DISEASE OF**; **ULCERS**, **SCROFULOUS**; **JOINTS**, **CHRONIC DISEASE OF**; **OPHTHALMIA**, **STRUMOUS**, &c., &c. Certain general appearances of the person are described as scrofulous types, especially two, viz.: (1) thick lips, muddy skin, coarse features, pot-belly, flabby muscles, often with tendency to fatness; (2) fair, thin, clear skin, long eyelashes, fine hair, pearly teeth, bright, refined, ‘delicate’ look. These so-called typical appear-

ances are of doubtful diagnostic value ; and it is not unlikely that the appearance of delicacy, corresponding to type 2, is often caused by the disease itself, and in no other way indicative of a predisposition to scrofulous inflammations.

Scrotum.—*Wounds* heal very readily. *Bruises* often produce *hæmatocele*, *quod vide*.

Scrotum, Diseases of.—The scrotum, consisting as it does chiefly of skin and cellular tissue, is liable to the ordinary cutaneous diseases. Moreover, inside its serous lining are found hydroceles, *hæmatocele*, hernias, and diseases of the testicle. Certain affections of the scrotum present special features worthy of note. The chief of these are (1) inflammation, (2) elephantiasis, (3) epithelioma.

SCROTUM, INFLAMMATION OF, is remarkable for the amount of *œdema* which accompanies it, for its usually diffuse character, and for its frequently ending in partial sloughings. Its usual *causes* are extravasation of urine, or continued irritation of some trivial local affection. *Prognosis* in every way good, except in bad cases of extravasation. *Treatment.*—*Vide ERYSIPELAS, and URINE, EXTRAVASATION OF.*

SCROTUM, ELEPHANTIASIS OF.—A cellulo-cutaneous hypertrophy, with more or less oily infiltration. Very rare except in the East and West Indies, in Egypt, and South America. Prime *cause* unknown. Exciting cause, occasionally some local irritation. The tumour may even attain a *weight* equal to that of all the rest of the patient, trunk and limbs inclusive. *Surface* sometimes smooth, sometimes tuberculated. *Prognosis.*—Steady growth. Perhaps eventually death from supervening ulceration. *Treatment.*—Excision. Control *haemorrhage* by a clamp. If the tumour is very large, it may be necessary to devise some contrivance to facilitate its manipulation, *e.g.*, fixing in its lower part hooks connected with tackle and the ceiling. Take a short posterior skin-flap from the healthy skin of the neck of the tumour. *See G. A. Turner, Glasg. Med. Journ.*, June, 1882, for the record of an immense experience of these cases, and for many valuable hints derived therefrom. *See also K. Macleod's 'Operative Surgery.'*

SCROTUM, EPITHELIOMA OF (CHIMNEY-SWEEP'S CANCER).—

Chiefly attacks chimney-sweeps. Commences as a wart or tubercle, 'oftenest near the lower and fore part' of scrotum (Humphry.) Structure that of epithelioma elsewhere. *Treatment*.—Excise. Decidedly enlarged glands in groin should be excised too. Very little tendency to affect the system, but great tendency to recurrence. Irritation of soot has been known to produce epithelioma on hand of a gardener.

Scurvy.—Believed to be a blood-disease. *Causes*.—Salt meats. Want of fresh meat and fresh vegetables. Subsidiary causes are severe cold, and all depressing influences. 'In former Arctic expeditions scurvy occurred in men who indulged to excess in alcohol, and who had not been exposed to the deteriorating conditions that existed during sledge-travelling.'¹ *Morbid Anatomy*.—Extravasations all over the body, beneath skin, in serous cavities, in viscera, and in intermuscular spaces. Extreme emaciation. Ulcerations. *Symptoms and Course*.—Premonitory signs, great lassitude, pains in joints. Then appear sore mouth, petechiæ, and, by-and-by, ulcers and blood-tumours. Hæmorrhages of various kinds, internal and external; progressive exhaustion. *Prognosis*.—Fatal, unless the causes be removed. Proper treatment rescues very bad cases indeed. *Treatment*.—Vegetables. Fresh meat. Lime-juice. Best attainable hygienic conditions. Treat local manifestations on general surgical principles. Owing to impossibility of melting lime-juice on sledge excursions in polar regions, concentrated lime-juice lozenges have been devised.

Scurvy of Infants ('Acute Rickets,' 'osteal or periosteal cachexia') occurs usually between sixth and eighteenth month of infantile life. Often attacks children presenting signs of rickets, especially severe head-sweating; but often, also, the patients have been previously quite healthy. The main symptoms are swelling of the limbs, great fretfulness, pallor, general wasting, and a kind of pseudo-paralysis of the parts swollen, which are usually the lower extremities, especially the thighs. Extreme tenderness. Frequently scorbutic symptoms, e.g., swelling or ecchymoses of the gums. What especially con-

¹ *Rep. of Com. on Scurvy*, in Sir Geo. Nares's expedition, quoted by Mr. H. Leach.

ncts the affection with scurvy is the sub-periosteal haemorrhage, which causes the swelling round the bones. It should be diagnosed from the osteo-chondritis of congenital syphilis (*q.v.*), which usually occurs at an earlier age, is more limited in extent, more symmetrical, and causes little pain or interference with movement. *Treatment.*—Combined anti-scorbutic and anti-rachitic. Consult T. Barlow in *Med.-Chir. Trans.*, vol. lxvi.

Septicæmia.—A disease in which the blood is poisoned by septic matter. In this respect it does not differ from pyæmia, and many if not all cases of surgical fever. Bryant even writes, 'Surgical, suppurative, or traumatic fever; septicæmia, ichoræmia, puerperal fever, and pyæmia may all be considered as so many different names for, and manifestations of, one condition, blood-poisoning.' In practice, however, 'surgical fever,' 'septicæmia,' and 'pyæmia' are not considered as different names for one condition, nor are they such in fact, though it is difficult to define the limits of each. Clinically, I have most often heard surgeons apply the term septicæmia to acute cases in which the nervous and digestive organs were the seat of prominent symptoms, while there was an absence of signs of secondary abscess. Compare with pyæmia. Authorities generally agree in recognising two forms of septicæmia,—(1) *Septic intoxication* 'from the absorption of the chemical products of decomposition of tissues and fluids, products incapable of undergoing multiplication in the system, and therefore of being transmitted from animal to animal with unimpaired virulence.'¹ (2) *Septic infection*, 'in which the poison is not only multiplied, but to a certain extent developed in intensity as it passes from one field of cultivation to another.'¹ *Causes.*—Of (1) septic intoxication, probably absorption of the chemical products of putrefaction; of (2) septic infection, probably inoculation of the blood with microscopic organisms. The chemical products which cause septic intoxication are doubtless formed only in the presence of such organisms.—*Vide Pyæmia.* *Signs.*—Apathetic state; rarely excitement. Tongue very dry. Speech feeble. No appetite. Either perspiration or dryness of skin. Symptoms

¹ Pepper's *Surgical Pathology*, p. 62.

often bear considerable resemblance to those of typhus. Urine scanty. Rigor, or rigors. Temperature, at first high, tends to fall as death approaches. Occasional extreme rapidity of rise.¹ Bed-sores form ; urine and faeces are passed in bed. Finally collapse and death. The elevation of temperature is often slight, especially in weak, old people. 'Intoxication,' as distinguished from infection, is to be diagnosed when there is a large surface of wound exposed to decomposing discharges without free escape, and when the symptoms come on very suddenly. But it is to be feared that, as regards the human subject at least, such diagnoses are only too often mere guesses. *Pathology.*—Condition of the blood not at all characteristic. 'If we have not seen the patient during life, we shall often examine the dead body in vain for some palpable cause of death' (Billroth). Spleen often enlarged and softened, rarely normal. Liver congested and very friable. 'In the heart the blood is lumpy, half-clotted, tarry, and rarely firmly coagulated, buffy : in most cases the lungs are normal. Rigor mortis sets in early, and soon disappears. Decomposition is very rapid. Disintegration of the red corpuscles goes on during life ; this is shown by the staining of the endocardium and the intima of the vessels, observed directly after death. The serum, too, is more or less deeply tinged and dark from de-oxidation of the haemoglobin. Micrococci are sometimes present (septic infection). The internal organs show marked congestion, especially at the most dependent parts. Thrombosis is very common, and capillary extravasation far from rare. The latter is most marked in the mucous and sub-mucous coats of the intestine, and beneath the serous membranes in the form of petechiae or more diffused extravasations. Meningeal haemorrhage is less frequent. If the skin presents a dusky jaundiced tint during life this will be found in the cadaver.'² Where the course of the affection 'has been very long (a fortnight or more) the disease shows itself mostly by extensive suppuration of the cellular tissue' (near the wound),

¹ From 102·6° to 107° in 10 minutes in a case under Mr. Bickersteth (*B.M.J.* 1879).

² From Pepper, *op. cit.*, p. 78.

'with more or less extensive gangrene of the skin' (Billroth).¹
Treatment.—*Vide PYÆMIA.*

Shock.—*Causes.*—Injuries, especially if very painful, or attended with haemorrhage; or if in certain localities, e.g., abdominal viscera, testicles, and the larger joints. Mental emotions. When an injury is foreseen and expected, shock is more severe than when the recipient is excited and careless. Children less liable than adults. But acute pain readily causes collapse in a few hours in children. (H. Marsh.) *Signs.*—Pallor, coldness, weakness, even amounting to utter prostration. Consciousness may or may not be seriously affected. The mind may be clear, and yet the limbs but little sensitive to pain. Temperature actually sinks 2°, 3°, or 4° or more in severe cases. Pulse threadlike. Respiration sighing. Nausea, vomiting. In certain cases the patient is noisy and delirious. Generally he is either quiet, or wanders slightly in his mind. *Course.*—Death may result almost instantaneously, even when the prime injury is apparently trifling. This is most common in injuries to the abdominal viscera. But reaction usually occurs in a few hours, and is frequently excessive, passing into fever. And again, shock may endure for many hours, and at last prove fatal. *Pathology.*—It is certain that paralysis of the vaso-motor nerves, probably inhibitory, is an essential part of shock; but it is not so certain whether it is universal or local. Goltz showed that when a frog is struck on the abdomen its heart ceases to beat, and at the same time the portal system is vastly distended with blood. He supposes the former phenomenon to be the effect of the latter, and the two together to account for the features of shock; but Moullin argues, and with reason, that, in shock, there is primarily a far more general inhibition of the vaso-motor system. *Diagnosis* from syncope, the result of haemorrhage.—When the haemorrhage is internal this diagnosis may be impossible at first; but in the case of haemorrhage, when reaction takes place, the pallor of the gums and conjunctivæ persists. *Prognosis* depends on the amount, on the persistence, and on the attendant complications of the attack. A particularly dangerous condition is that

¹ See also 'Microscopic Organisms.'

termed 'prostration with excitement,' in which 'the languor or stupor of collapse is succeeded by restlessness, jactitation, tremor, and twitchings of the muscles, praecordial anxiety, often but not always delirium of various degrees' (Savory). *Treatment.*—Warmth, hot water bottles to feet, flanks, and epigastrium, warm affusion to head. Horizontal position. Frictions. Stimulants: brandy, ammonia. Do not pour fluids down a patient unable to swallow. Galvanism to praecordia. Treat haemorrhage if present. Remember that collapse in some cases of internal haemorrhage is useful by giving time for nature to close the bleeding vessels. In such cases the treatment had better be limited to horizontal posture, strict quiet, external warmth, and such action as the bleeding may demand. Transfusion in severe cases of shock with haemorrhage. When reaction has commenced food must be given, *e.g.* small quantities, frequently repeated, of brandy and egg mixture, milk, and strong soup. With regard to amputating during shock, the surgeon seldom hesitates now, relying upon the relief from pain and discomfort which follows the removal of a mangled limb. But every care must be taken to prevent haemorrhage, which is very badly borne by a collapsed patient.

Sinus.—An abnormal passage whose length decidedly exceeds its diameter, and which is not a healthy, healing wound. Paget, in describing *sinus* and *fistula* together, says they include three classes, *viz.*—(1) long, narrow, suppurating canals, (2) canals giving unnatural exit to secretions (*e.g.* gastric fistula, biliary fistula), (3) abnormal apertures between mucous cavities (*e.g.* vesico-vaginal fistula). He adds that 'if a distinction is to be made between the terms,' 'sinus' should be applied exclusively to those of the first form, in which the canal has but one opening. *Causes.*—Usually (1) abscess; sometimes (2) wound, (3) ulceration, (4) sloughing. In addition to these, one or other of the following secondary causes almost essential, *viz.*—(1) presence of dead bone, or of foreign body, (2) some mechanical obstruction to the free discharge of pus, (3) the occasional passage of secretions or excretions into the sinus, (4) presence of diseased glands (strumous or other-

wise), (5) a lining of septic granulations. Passage of sinus among muscles is a cause which may be classed with (2). *Treatment.*—Find out and treat cause. Sayre's vertebrated probe may be useful when track is sinuous. Remove dead bone, &c. Slit up, if situation of sinus permits. Scrape out. Iodoform. Injections of iodine, tannic acid, Condy, &c. Solution of zinci chloridum (40 gr. to $\frac{3}{4}$ j.), best antiseptic for old sinuses. Use once, but thoroughly. Follow up by pressure and antiseptic dressings. Antiseptic bougies. Drainage by passing a tube to the bottom of the sinus. This can be combined with injection. Cautery, especially galvanic or benzoline cautery. If the sinus pass among muscles, and cannot be slit up, the attachments of these muscles should be fixed by splints, bandages, &c.

Skin, Diseases of. See ECZEMA, ECTHYMA, PSORIASIS, CORNS, WARTS, ELEPHANTIASIS, SCABIES, &c. &c.; only the commonest forms are noticed in this work.

SKIN, TRANSPLANTATION OF.—(1) Minute pieces of epidermis, which should include the youngest layers, namely, those next the true skin, are shaved or cut off and placed upon the surface of a healing ulcer, in order that they may there form nuclei whence cicatrisation may spread. (2) Skin is sometimes only partially severed from its connections, and then, with the circulation still active within it, transferred to the raw surface of another part. In this way, *e.g.*, gaps in the skin of the chest may be filled in from that of the arm. Of course the arm has to be bound to the bosom until the skin has formed adhesions in its new site. In certain cases the position of two portions of skin can be exchanged with advantage. (See *Lancet*, Feb. 19, 1887.) (3) Pieces of skin even of considerable size, thoroughly cleansed free of subcutaneous tissue, have been successfully transplanted without any pedicle being left attached to them.—*Vide* papers by Wolff of Glasgow. In the first (far the commonest) method it is enough to place a small piece of gutta-percha tissue over each transplanted fragment, and to cover with boracic dressings.

Skull, Injuries of. See HEAD.

Snake-bites. See BITES OF SNAKES.

Spectacles. *See Appendix.*

Spermatic Cord.—Frequently affected secondarily to the testicle, *e.g.* by cancer. Subject independently to hydrocele (*quod vide*), haematocele, lipoma, neuralgia, &c.

Spermatorrhœa. An abnormal discharge of semen. A chronic disorder. Nocturnal emissions, if not oftener than once a fortnight, scarcely considered abnormal. *Cause.*—Almost always masturbation. *Symptoms.*—Niemeyer describes four classes of cases: (1) persons who have unnatural emissions simply because they continue to masturbate. To their doctor they describe such symptoms as 'nervousness,' lassitude, palpitation, various exaggerated pains about the genitalia, &c. They readily confess that they have practised self-abuse, but pretend they have given it up. (2) Robust-looking persons who have really given up their bad habits and recovered their general health, but who are sexual hyponchondriacs for some other reason. (3) Weakly, anaemic persons, who have never masturbated, and in whom ordinary and not frequent wet-dreams produce dulness and lassitude. (4) True cases of spermatorrhœa, in which exhaustion, &c., are really produced by too frequent seminal losses. Their symptoms are as follows: sadness, dislike to work, lassitude, inattention, cowardice, tremblings, noises in the head, dizziness, neuralgic pain in back of head, &c. *Resemblance to hysteria.* In these cases especially, semen often flows away with the urine, or during defæcation. But note, the latter symptom is not uncommon in healthy men. Distinguish between mere mucus and semen by the microscope, which in the latter case should discover spermatozoa. *Pathology* of the last form (true spermatorrhœa).—Probably a state of chronic congestion and relaxation about the prostatic part of the urethra and the openings of the seminal ducts, added to an undue irritability of the nervous system; in fact, a condition similar to the hysteria caused in women by ulceration of the os uteri. *Prognosis.*—Cure difficult in many cases, (1) because patient will not refrain from bad habits, either of self-abuse, of alcohol-drinking, of excessive meat-eating, of lying in bed in the morning, or of sedentary employment without proper outdoor exercise; (2) because of chronic

nature of ailment. *Treatment*.—Insist upon total abstinence from the vices just enumerated. The difficulty of stopping masturbation is well known. It seems to me that the most rational indication is to be derived from its being essentially a secret vice, practised chiefly or entirely in bed. A patient who eventually lost his reason through it, even when the habit was inveterate, always ceased from it so long as his attendant slept in the same bed with him. The sex of the bedfellow does not affect the result, therefore marriage may be advisable. Occasional intercourse with lewd women, which has been recommended even by physicians, is of somewhat doubtful value, especially if irregular, and is of course morally objectionable. Cold hip-baths in the morning. Patient should get up and empty his bladder as soon as ever he awakes in the morning, even if he gets into bed again. Hard mattress. No suppers; no tea in the evening. Attend to digestion. Revalenta Arabica, or fish and milk diet may be useful. Keep bowels open. Blisters to perineum. When varicocele or relaxed genitalia co-exist, patient should wear my suspensory bandage, made by Arnold, of West Smithfield. If improvement be not satisfactory cauterise prostatic part of urethra with Lallemand's 'porte-caustique.' Repeat three or four times if necessary. Drugs given are (1) belladonna, gr. $\frac{1}{4}$ of extract + zinci sulph. gr. ijss. *ter die*; (2) bromide of potassium. Phosphorus, quinia, strychnia, iron, and cantharides are given when spermatorrhœa is associated with impotence.

Spine, Diseases of.—Term 'spinal disease' sometimes restricted to caries. Angular curvature is, of course, always described with caries. Besides the above, there are lateral and antero-posterior curvatures, hysterical and rheumatic affections, and spina bifida.

ANGULAR CURVATURE : POTT'S CURVATURE OF THE SPINE : CARIOSIS OF THE SPINE.—These three terms are not quite synonymous, but they are constantly used as such. Caries precedes and causes the curvatures. *Causes*.—Local tubercular infection. Male sex predisposes in children, female sex in young adults, rare in more advanced life. Often a history of a fall or blow, to which the localisation of the disease may have been

due.¹ *Pathology*.—Commences either in the vertebral bodies, or as inflammatory softening of the intervertebral cartilages. As the destructive process proceeds, two striking effects result, viz. : (1) a posterior angular projection of the corresponding spinous processes ; (2) less frequently, formation of abscess. As many as six or eight vertebral bodies have been known to break down : usually only two or three are involved. Laminae, spines, and articular processes escape ; but there is a great tendency for them to ankylose together. Collapse of the spine anteriorly at the seat of caries causes the posterior angular projection. Compensatory curvatures in other regions of the spine. Curvature in lumbar disease occasionally lateral as well as antero-posterior. Posterior angular projection in this region of the spine concealed at first by the normal lumbar lordosis. Middle and lower dorsal regions commonest seats of caries. Spinal cord is (1) so small as compared with diameter of spinal canal, and (2) so well protected by its membranes, that it is usually unaffected ; but in many cases *paraplegia*, usually motor and partial, and often temporary, occurs. The immediate cause of the paralysis is probably inflammatory effusion, or else pressure from a sudden, rapid increase of the deformity. Even aorta may be compressed between the diseased vertebræ as the latter fall together.² *Abscess* usually 'psoas' in disease of dorsal or lumbar vertebræ ; frequently lumbar. In cervical caries, abscess usually presents towards side of neck, sometimes in pharynx (retro-pharyngeal abscess). But the pus may burrow in various directions, e.g. into pelvis, buttocks, abdominal wall above Poupart's ligament, and from the neck into the thorax. *Psoas abscess* passes down in the sheath of the psoas muscle, forming a swelling first in the inguinal region of the abdomen, and next in the thigh beneath Poupart's ligament, towards the outer rather than the inner side of Scarpa's triangle. It may extend downwards much farther, and occasionally turns outwards or inwards.

¹ See a paper by Mr. Willett in *St. Barth.'s Hosp. Reports*, vol. xiv. p. 825. Out of 60 cases, the assigned cause was a blow or fall in 21 cases, previous illness in 5, and cause unknown in the remaining 34 : 14 were described as strumous subjects ; that is, were sickly, delicate persons of strumous aspect.

² See Goodhart, *Path. Trans.*, 1878.

Sometimes it is double, i.e. passes down the sheaths of both psoas muscles. *Lumbar* abscess perforates the quadratus lumborum, and presents in the loins immediately external to the erector spinae. Spinal abscess may (1) be absorbed, or (2), after a more or less chronic course, burst, or (3) be opened by the surgeon. When opened, unless antiseptic precautions be taken, fever supervenes. When ankylosis takes place, even the laminæ and spinous processes of adjacent vertebræ unite.

Symptoms.—In children, the first sign observed is generally a prominence of one or more vertebral spines ; but if the lumbar region be affected no prominence may be discovered till after the appearance of abscess, or signs of general or local weakness and pain. Adults usually remark pain and weakness before deformity. The erector spinae, rigid at first, soon atrophies. Deformity varies in extent from the slightest degree up to a huge 'hump.' Compensatory curves in the lumbar and cervical regions make the chin project and the head sink down beneath the shoulders. To take weight off spine, patient supports himself with his hands on his knees. When picking up an article from the floor, he squats down, keeping the affected part of his back rigid. If the atlo-axial joint be affected, he turns his body to the right or left instead of rotating his head. Pain may be absent. In acute cases pain and tenderness are excessive. Often more pain is felt in the side or abdomen than in the spine. Paraplegia may come on, or temporary want of control over the sphincters. Incapacity for and dislike to active exercise : health suffers in consequence. When abscess opens spontaneously, chronic septicæmia may result, and health break down rapidly, or abscess may dwindle to a comparatively unimportant sinus. *Diagnosis.*—Usually easy. Sometimes difficult (1) at commencement, (2) when it occurs in hysterical females. A lateral curvature often results from caries of the lumbar vertebræ ; but in this case there is no rotation, as in true lateral curvature, and there are probably collateral signs of caries. Some persons attach importance to eliciting pain by concussing the top of the head, or by running a hot sponge down spine. Stiffness of spine, and rigidity of erector spinae, early signs. *Prognosis.*—Favourable as regards life when proper

treatment is adopted. Prospect of undoing angle of curvature hopeless. Paraplegia is frequently recovered from. *Treatment* —(1) rest in bed, (2) movable supports, (3) fixed supports, (4) operative measures. Also general treatment. Rest in bed essential in the worst cases, *e.g.*, those complicated by both paraplegia and abscess ; but it is itself injurious by taking away the benefits of fresh air and exercise, and even when in bed the spine should be securely fixed. Spinal supports are of various kinds. If an apparatus be applied, it should be frequently examined and adjusted. Fixed apparatus, plaster of Paris, poro-plastic, leather, paraffin, &c. To Sayre is chiefly due the credit of demonstrating their value. He uses bandages with plaster of Paris, applying them from below the anterior superior iliac spines up to the armpits, while the patient is suspended by a collar beneath the chin and loops in the axillæ, his toes only touching the ground. The bandages are made of crinoline. Pads of cotton-wool over epigastrium, female breasts, and prominent spines. Tight-fitting jersey next skin. For the sake of cleanliness, two white handkerchiefs or similar pieces of thin linen may be placed beneath the jersey, one before and one behind. They can be changed by stitching clean ones to them, and dragging the clean in as the soiled come out. Patient lies horizontally for an hour after application of jacket (longer if convenient). Similar apparatus applied with patient in supine position (Walker),¹ or suspended from the armpits and hips in prone position (Willett), or in hammock (Davy). Patient's complaints as to pain, &c., should be attended to, lest a sore form from pressure over projecting spines. The suspending rope should be held by hand, as grown-up people sometimes turn faint, and require instantly lowering to the horizontal, and little children might get hanged if hooked up and left. Case should be cut up at least once in three or four months ; six months minimum of treatment. With a Sayre's case, exercise and play become enjoyable by patients to whom walking had previously been impossible. In case of pain near the prominent spine, cut a crucial incision in the jacket. When the cervical region is affected, the head should be either

¹ See *Brit. Med. Journ.*, Dec. 1878.

suspended from a jury-mast, or supported by a leather collar, well moulded to the chin, occiput, and base of the neck. Use the jury-mast also in upper dorsal cases. *Treatment of abscess.*—Open early with strict antiseptic precautions, and drain thoroughly. There has lately been a tendency to open psoas abscesses nearer their origin than the front of the thigh, where they usually point eventually and used to be opened. Lister went above Poupart's ligament. Chavasse of Birmingham goes a little higher still, making a dissection down upon the psoas something like that made where one of the iliac arteries is to be tied. Treves¹ and Macewen² have used a lumbar incision, thus going as near as possible to the seat of caries. I have employed a similar incision myself, and combined with drainage the local application of iodoform by injecting a solution of it in ether. To cut down upon the psoas from the loin, and even to reach and examine the bodies of the lumbar vertebræ, is not a difficult proceeding in the case of a patient with wasted muscles. Employ a perpendicular incision as long as there is room for, but not extending upwards too near the last rib (down to which the pleura descends). This incision should be somewhat external to the tips of the transverse processes. All the structures may be freely divided to the extent of the skin incision down to the depth of the transverse process. At and beneath that level it is necessary to proceed cautiously on account of the lumbar arteries, whose abdominal branches run behind the quadratus lumborum, one corresponding to each interval between the transverse processes. Upon palpating the original seat of caries, it is sometimes felt smooth and cicatrised, in spite of the existence of abscess. By opening spinal abscesses early, from the loin, much burrowing of pus is prevented, tension possibly relieved, and thorough drainage made easy.

Hueter used to recommend repeated injections of a solution of carbolic acid into the tissues near the carious vertebræ.

Setons, the moxa, the actual cautery, &c., have also often been employed, occasionally with great benefit.

Constitutional treatment is conducted on general principles.

¹ Med.-Chir. Soc. London, Jan. 1884.

² B. M. J., Jan. 19, 1884.

Cod-liver oil, Parrish's food, seaside, fresh air, sufficient diet, repose, &c.

SPINE, LATERAL CURVATURE OF (SCOLIOSIS).—In practice the lateral curvatures which sometimes result from empyema or from lumbar caries are not included under this head. *Causes.*—Muscular weakness and excessive sitting or standing in a lounging position about the age of puberty are usually blamed, and doubtless play their part in the causation. Female sex much more than male. Inequality in length of lower extremities. But the essential cause is, in infancy, rickets, and during adolescence, an allied disorder which may be termed 'rachitis adolescentium.' (See KNOCK-KNEE.) *Pathology.*—Almost always two, usually three, and sometimes even more curves. Lumbar curve has generally its convexity to the left, in cases arising after childhood, but to the right in rickety cases. Lumbar and dorsal curves together form a line like the italic *S*. Simultaneous rotation of vertebrae, so that in each curve the bodies of the vertebrae which form it are turned towards its convexity. Hence the actual extent of lateral curvature of the bodies is greater than the apparent amount of curvature noticeable by merely examining the line of spines. Hence, also, the transverse processes on the side towards the convexity are twisted backwards, while those on the side of the concavity turn forwards. Thorax is rotated forwards and compressed on the concave side, and rotated backwards and dilated on the convex side of the dorsal curve. Waist sinks in on concave side of lumbar curve and disappears on the opposite side, where its place is taken by a depression half-way up the thorax. Thus in an ordinary case of lateral curvature we should notice, (1) in the middle line, the row of spinous processes curved with the lumbar convexity to the left and the dorsal to the right; transverse processes prominent on the convexities, sunk in on the concavities; (2) on the left side, the waist bulging, a spurious waist caused by a depression in the thorax, and the thorax itself prominent anteriorly, flattened posteriorly, and compressed throughout; (3) on the right side the shoulder prominent ('growing out'), the thorax dilated and forming a large swelling posteriorly, the waist sunk in and the hip

prominent. In bad cases the last rib on this side impinges on the iliac crest. It is extremely likely that the immediate cause of lateral curvature is a modified growth of the bones due to an affection of the epiphysial cartilages, like that which causes knock-knee. The curvatures become confirmed by the bones themselves altering in shape, atrophying where pressure is increased, hypertrophying where pressure is taken off. *Signs* are essentially the naked-eye appearances which result from the changes just described. *Diagnosis*.—See ANGULAR CURVATURE. To distinguish true from simulated lateral curvature, make the patient bow down low. In the former case the curve in the back persists, also in true scoliosis the amount of rotation bears some proportion, though not a uniform one, to the amount of lateral inclination. In temporary or neuromimetic lateral curvature, the lateral inclination is great, and the rotation absent, or else confined to the lumbar region and not permanent. *Prognosis*.—Difficulty of cure very great. Severe cases practically hopeless. Even commencing cases require most vigilant management. *Treatment*.—Various plans; almost all endeavour to combine extension, exercise, and localised pressure. Many forms of spinal support. Sayre's plaster case, arranged to take off and to lace up. Felt cases. Gymnastic exercises, especially swinging by the hands. Standing and sitting are to be avoided. Rest should be taken in the horizontal position. Attend to general health. Tonics; fresh air. Treat menstrual irregularities. Of course, search should be made after any possible exciting cause, and its removal effected if possible. Friction to restore tone to spinal muscles. According to my experience, Sayre's treatment at least prevents bad curvatures from getting worse, improves moderate ones, and arrests incipient cases; but daily extension by collar and pulleys is essential. Great benefit can be got from massage and gymnastics. The cases in which this or any other treatment seems to work marvels are not cases of lateral curvature at all, unless the term 'lateral curvature' be applied to every case in which mere lateral *inclination* of the spine exists. It is also pure nonsense to talk of a first stage of lateral curvature without osseous deformity. Osseous de-

formity exists at the very commencement of every case of the disease we have been describing. Whereas, in those cases in which the patients, usually young women, simply carry themselves to one side, the osseous structures are but little altered even after years of such a condition. These are the cases on which massage, gymnastics, and sometimes, though less commonly, even spinal apparatus work wonders. They are neuro-mimetic.

SPINE, ANTERO-POSTERIOR CURVATURE.—*Lordosis, Kyphosis.* Frequently secondary to hip-disease. Then there is little or no osseous deformity. Muscular weakness and laziness lead to these deformities rather than to scoliosis. Rheumatism. Arthritis deformans. Lumbar lordosis, often compensatory to angular curvature higher up the spine. In lordosis the concavity is posterior, in kyphosis it is anterior. *Treatment.*—Drilling, careful exercise, with intervals of abundant horizontal repose. Attention to posture. Treat rickets if present. In these cases, a removable plaster or felt corset combined with daily extension and massage should be employed for a considerable time, then left off gradually, the intervals of wearing it being occupied in judicious exercises, frictions, careful attention to carriage, and abundance of horizontal rest. But the above proceedings must not be employed when the deformity is secondary and compensatory. Lordosis due to osseous ankylosis of hip in flexed position requires osteotomy of the hip, an operation which when properly done for this deformity is one of the most satisfactory and effective proceedings in surgery. (*See OSTEOTOMY.*)

SPINE, HYSTERICAL.—Sometimes simulates spinal caries, sometimes scoliosis. Spasms, paralysis, difficult micturition, often local tenderness. But 'tenderness is excessive and superficial, so that the patient flinches, and complains more when the skin is pinched than when the vertebrae are pressed.'¹ There is never found the stiffness characteristic of spinal caries. No proportionate general wasting. Probably weak circulation and uterine or ovarian disorder. *Treatment.*—*See HYSTERIA.* Massage, gymnastics, fresh air. Weir Mitchell's treatment.

¹ See Savory, in Holmes's *System*, vol. i. p. 381.

SPINA BIFIDA.—*Causes.*—Defective development and non-union of vertebral laminae and spines, usually in lumbar region. Excess of cerebro-spinal fluid in foetal life, according to Lowne. *Pathology.*—Perhaps primarily a local inflammatory dropsy of spinal meninges. At all events, these membranes bulge through defect in spinal canal. Spinal cord or spinal nerves often in the tumour (when present, always near middle line, though often widely spread). Dura mater and arachnoid blend with skin. *Symptoms.*—A fluctuating tumour in median line behind, usually in lumbar region, sessile or pedunculated, often translucent, springing from the bones ; may be partially reducible by pressure—such pressure may cause spasms or convulsions. May swell when child cries. Skin thickened and rough, or thin and bluish-red. *Diagnosis.*—It is usually easy to see that a true spina bifida is one. It is not always easy to be certain that a cyst closely connected with the bones is not one. Compare each case with the signs just detailed. *Prognosis.*—Grave. More hopeful when the neck of the tumour is very narrow. *Treatment.*—(1) palliative, (2) radical. Palliative : a leaden shield, well-padded and accurately fitting. Radical : three forms, viz., (1) injection with iodine, (2) pressure, (3) excision. Operation very dangerous ; and surgeon should be content with palliative measures, unless tumour is getting steadily worse or on point of bursting. Pedunculated tumours offer best prospect of success from injection. An endeavour should be made to isolate sac from general cavity of spinal membranes during injection. Sometimes long-continued pressure, *e.g.* by Dupuytren's enterotome, will effect this isolation permanently, and thus cure the case. To inject iodine, a part of the fluid should first be drawn off, and then two drops of pure tincture of iodine injected. (See Holmes's *System*, vol. v. p. 806.) Repeated aspirations may be tried without injection. Morton, of Glasgow, has been very successful with the following injection :—℞. Iodi gr. x. ; pot. iod. gr. xxx. ; glycerini ʒj. About ʒss. to ʒij. is injected through a medium-sized cannula. Repeat if necessary. Avoid unnecessary escape of spinal fluid.

Spine, Injuries of, include dislocation, fracture, and

sprain. With these should be studied concussion, traumatic compression, and traumatic inflammation of the spinal cord and its membranes.

SPINE, DISLOCATIONS OF.—*Causes.*—Usually indirect violence, *e.g.*, the back being violently bent forward by a soft body falling on the head of a person stooping. Occasionally direct violence, or even (in atlo-axial region) destruction of the ligaments by disease. *Usual Situation.*—Lower cervical region. *Direction.*—Upper vertebra is almost always displaced forwards. *Signs.*—Mostly 'rational' and indirect. The most important depend on injury to the cord: paralysis of parts supplied by nerves given off below seat of injury. Perhaps local pain and tenderness. Shock: collapse at first. In some cases manifest deformity. *Variations in Symptoms according to Seat of Injury.*—(1) Dislocation in lower lumbar region. As a rule, merely partial paralyses of lower limbs or pelvic organs from partial injuries to cauda equina; (2) upper lumbar region—paralysis of lower limbs and sphincters; (3) lower dorsal—paralysis of abdominal wall also; (4) upper dorsal—impaired breathing from paralysis of intercostals; (5) lower cervical—paralysis of every part below neck except diaphragm, respiration entirely diaphragmatic; (6) above third cervical vertebra, *i.e.* above origin of phrenic nerve—instant death. Of course the higher lesions include all the paralytic effects of the lower. Priapism. Later symptoms: alkalinity of urine and catarrh of urinary organs; bed-sores. These last-mentioned complications cause death eventually. But in cervical dislocations, death results from obstruction of the lungs by frothy secretion. *Diagnosis.*—From (1) fracture, hardly possible. From (2) mere concussion, by sudden onset and by nature of cause; also by deformity when there is any. *Prognosis.*—Its badness varies directly with the height of the vertebrae displaced. High cervical dislocations perish usually in from two to three days, dorsal in two or three weeks. But dorsal may recover, lower dorsal frequently do so. Lumbar offer hopes even of complete cure. *Treatment.*—Rest on back. Gentle examination and nursing. Gentle extension. Withdraw urine twice daily; wash out bladder if urine become alkaline. (See

BLADDER, CATARRH OF.) Attend to bowels with enema. The nursing is of vital importance. Smooth, clean sheets, gentle change of position, dryness, daily examination of sacral and trochanteric prominences. Good food. Trephining is for the most part condemned, but this is one more question which has been re-opened by the advent of antiseptic surgery. In certain cases of injury to the spine, especially if in lumbar region, it is best to apply a plaster of Paris corset, during extension. Sayre and others have published cases of this sort, and I have had one very successful (dorsal) case myself. Apparently authentic cases have been recorded by Malgaigne and others, in which even cervical dislocations have been reduced by extension and pressure.

SPINE, FRACTURE OF.—Almost everything written above of *dislocations* is applicable to *fractures*. In practice it is seldom that any distinction is or can be made during patient's life. **Seat.**—More frequent in the cervical region, but common enough in the dorsal.

CONCUSSION OF THE SPINE.—A term applied to a variety of traumatic affections which can easily be differentiated *post mortem*, and sometimes more or less easily diagnosed during life. They concur in having one common cause, and in tending, so far as the worst cases of each kind go, towards similar, if not identical, terminations. The common cause is injury to the cord without fracture or dislocation of the spine. The worst termination is disorganisation of the cord with consequent paralysis. Fortunately most cases stop short of this. Conditions included in the term '*Concussion of the Spine.*'—1. Mere concussion. 2. Compression from haemorrhage or effusion. 3. Laceration. 4. Inflammation. **Causes.**—Injury direct or indirect, to the spinal column. Especially common in railway accidents. Blows, falls. **Pathology.**—Amount of visible injury in the cord varies from slightest swelling or ecchymosis to considerable contusions, lacerations, ecchymoses, effusions, and haemorrhages. Membranes of cord suffer also. Ligaments of spinal column sometimes sprained or torn. At a later stage are found softenings and thickenings, and still later, atrophy or disintegration. **Signs.**—The most serious symptoms

arise much more from secondary inflammation than from the injury itself. Concussion may be localised or diffused. When the injury is localised in one part of the cord, either (1) the rational symptoms are confined chiefly to paralysis or irritation of the nerves arising from that part, or (2) the local mischief is severe enough to damage the functions of all the cord below seat of injury. But the smallest local injury may serve as the starting-point for the gravest general disease. In diffused or general concussion the signs are often remarkably vague and insidious. Earliest are lassitude, irritability, 'inaptitude,' sleeplessness. Then come pains and numbness in various parts. Next, fixed pain in the back and rigidity of the spine announce definitely the presence of spinous or intra-spinous inflammation. Then, uncertain gait, general clumsiness, disorders of sight, hearing, taste, or smell, mental confusion, paralysis. *Diagnosis.*—(1) From fracture or dislocation of spine. (Compare with *Dislocations of Spine*.) The symptoms are usually less decided, less sudden, and less severe. (2) From hysteria. (3) From malingering. Sometimes very difficult. Attach greatest weight to objective symptoms, but notice if any of these vary when patient is off his guard. Cross-examine about subjective symptoms; but gross exaggeration is not uncommon when real concussion is present, so the detection of one falsehood proves little. Test by galvanism. Muscles really paralysed do not contract properly under galvanism. Extensor muscles usually most affected. *Prognosis.*—When symptoms last long and are extensive, recovery is unlikely unless a claim for damages is still under consideration. The settlement of such a claim is often followed by speedy improvement. *Treatment.*—The most trivial case deserves complete rest in horizontal posture till the main symptoms have passed away. Prone position preferable. Moderate or low diet. No stimulants. Calomel, gr. v.-x. When local pain or tenderness is present, dry cupping. Ice-bags. Pot. bromid. and chloral hydrat. gr. xx.-xxx. at night. Later stages: mercury, e.g. liq. hydrarg. perchlor. 3j. t. d. s.; or pot. iod. Counter-irritation over spine, blisters, &c. Beware of over-drugging the patient. Still later, when active disease in the spine seems to have passed

away while its effects remain, employ strychnia, tonics, exercise—passive or active, massage, galvanism, change of air and scene.¹ Injuries to the spine and its contents are especially important in connection with railway collisions. The subject is treated at length in the works of Erichsen and of H. W. Page.

SPINAL CORD, COMPRESSION OF,
SPINAL CORD, TRAUMATIC INFLAMMATION OF, } are noticed
as secondary phenomena occurring in the course of a case of
Concussion of the Spine. (See above.)

Spleen, Injuries of. *Vide ABDOMEN.*

Splenectomy.—Up to February 1882, 29 cases had been recorded, only 4 before 1865.² In 1867, Péan was successful. Of 16 done for leucocythaemia, all died. Of 11 authentic operations for spleens otherwise affected or injured, 6 recovered.

Operation.—Incision usually in middle line extending both above and below umbilicus. Proceedings analogous to those in ovariotomy. Intestines pressed back with warm sponges. Spleen brought out. Adhesions managed as in ovariotomy. Pedicle tied with silk, usually ‘*en masse.*’ Drainage-tubes. Antiseptic precautions. Chief dangers—haemorrhage, shock, sepsis.

Spondylitis deformans. *See Sturge, Trans. Clin. Soc., vol. xii. p. 204.*

Sponge-grafting. *Vide Hamilton, Edin. Med. Journ., Nov. 1881; also Franks and Abraham, Journ. of Anat. and Phys., vol. xvii.*

The object of the process is to furnish a framework into which granulations may grow, and which, though organic and ultimately absorbable, is yet of great durability. The pieces

¹ I would suggest that in the case of many patients, especially those with trivial concussion who will not keep the prone position, and in the case of other patients convalescing, a plaster of Paris jacket would be useful. Certainly nothing does so much good to the very common injuries of the joints of the limbs to which children are subject; and many cases of so-called ‘spinal concussion’ must be primarily sprains of intervertebral ligaments, while other cases would benefit from thorough local rest.

² According to Collier, *Lancet*, Feb. 11, 1882. But Otis (*Med. Hist. of War of Rebellion*) says that as many as sixteen splenectomies had been performed before the present half-century.

used should be small, quite free from earthy particles, and thoroughly asepticised.

Sprains.—A class of injuries in which the soft parts of and above joints are stretched or torn. *Causes.*—Usually a sudden wrench or twist occurring when the patient is unprepared to bring his muscular power to the assistance of his ligaments. Sprains are not unfrequently accompanied by fracture, the tendons or ligaments in such cases being stronger than the bony processes to which they are attached. Complete rupture of a tendon is commonly described as an accident distinct from a sprain. (*See TENDONS, INJURIES OF.*) Most sprains of severity involve laceration of the capsular ligament. Blood is rarely effused into the joint in any quantity, but subcutaneous ecchymosis is very common. Serous effusion into joint-cavity, and inflammatory swelling of surrounding soft parts takes place. Pain often excruciating, heat and tenderness—usually best marked at certain points. *Diagnosis* is to be made from fracture by negative evidence. Trust as much as you safely can to your eye, and to the history of the case. Prolonged physical search for crepitus to be much condemned. *Treatment.*—Methods apparently diametrically opposed succeed with these injuries. In the great majority of cases nature is thoroughly competent to cure sprains unassisted. Many people 'walk them off,' as they say. Sprained thumbs habitually get what is really no treatment at all ; yet, common and severe as they are, how rarely any permanent harm comes from them ! On the other hand, almost all the surgical authorities, alarmed by the number of joint-diseases and the like which are attributed (with more or less truth) to neglected sprains, warn us to fix sprains with wooden or iron splints for weeks. There may be some doubt about the amount of harm to be really attributed to treating sprains by motion ; but there can be no question whatever about the mischief done by the abuse of rest. A treatment which will be found very successful (see the writings of Hood, Cowling, Pilcher, and the traditional practice of thousands of the laity) is to supply the place of the torn ligaments by applying, carefully and thoughtfully, bandages outside the joint, to limit effusion and

inflammation by the pressure of such bandages, and to secure elasticity, and thus permit a certain amount of movement, by means of plenty of good cotton-wool, or else by using india-rubber bandage, which probably fulfils all the above indications better. This india-rubber bandage, if properly applied, gives great relief in cases of flat-foot, the pain of which arises partly from a kind of chronic spraining of ligaments and tendons. When the sprain is severe, complete rest for a few days may be desirable, and *severe* exercise should certainly never be allowed till it is quite well. The mobile treatment prescribes, or rather permits, only gentle, regulated, limited movements; and what it chiefly condemns is the continual and repeated resort to splints.¹ Under such a treatment it sometimes happens that each fresh walking experiment reveals a worse and worse state of things; the patient goes to the bone-setter, submits to a little violence, courageously defies his doctor's warnings, walks about, and gets well. Hot fomentations often give great relief to pain. When the treatment above sketched fails, as it will sometimes, then is the time for putting on a plaster of Paris case. The perfect recovery of old sprains is often prevented by the presence of adhesions in or about the joint. Break down these by free movements. If inflammatory reaction is feared, fix up the limb for a few days and apply an ice-bag.

Some light is perhaps thrown on the contrasted course of sprains occurring in different persons, or at different times in the same person, by recent experiments on the artificial production of osteo-myelitis by inoculation with cultivated organisms from a case of the disease. The experiments were only successful when an injury was at the same time inflicted on one of the animal's bones.

Sterility.—In males, usually a consequence of *impotence*, *quod vide*. But there are cases in which men perfectly virile are yet sterile. No rules can be given for the treatment; but if the surgeon should be consulted on an alleged case, he should

¹ Sir James Paget says, 'In deciding upon resorting to manipulation in old cases, I believe you will be safe if you will take the temperature of the part for your guidance.' Rest is counter-indicated when the joint is cold.

inquire carefully into it, and possibly he may do good—even if it be only by finding that the patient is not really sterile at all.

Sternum.—Liable to necrosis from syphilis, from struma, or from injury. This may lead to abscess and perforation, and occasionally to mediastinal abscess. *Treatment.*—Apply general principles, for which see BONE, CARIES OF ; SYPHILIS, &c.

Struma. *See SCROFULA and TUBERCULOSIS.*

Synovitis. *See JOINTS.*

Syphilis.—Former extended application of the term so as to include all venereal diseases, even gonorrhœa. In modern language usually restricted to the constitutional disease, and to such primary sores as are followed by infection of the system. But it is considered natural and convenient by most writers to place together, for descriptive purposes, the soft non-infecting chancre and the 'hard' or 'Hunterian' chancre with its consequences. The same plan will be followed here.

VENEREAL DISEASES.—1. Gonorrhœa (*see* separate notice). 2. Soft sore (false syphilis). 3. Syphilis proper.

SOFT SORE, soft chancre, simple chancre, chancroid. *Causes.*—Inoculation from another soft chancre. According to Hutchinson's views, it is non-specific in origin, and arises merely from inoculation with pus, the result of ordinary suppuration at a certain stage. Contracted not only through impure sexual intercourse, but occasionally also by accoucheurs, midwives, &c., accidentally. Bassereau, 'by the aid of repeated confrontation of the patients infected with those who had given them the disease, succeeded in proving that' soft chancre 'resulted from a chancre of the same kind.' *Relative frequency* (as compared with hard chancre).—Four to one (8,045 to 1,955). But the proportion varies with time and place. *Objective characters.*—(Period of incubation, nil.) Successively, redness, slight swelling, vesicular pustule, ecthymatoid pustule, ulcer. Ulcer is rounded, clean-punched, spreading, rather deep, with a floor, uneven, dirty-looking, purulent, and with abundant highly contagious secretion. Any hardness of base is rare ; but such as there is, is that of ordinary inflammatory thickening. *Course* is progressive, *tendency* destructive for three or four weeks ; then natural termination is in cicatrisation, with depressed

white soft scar. *Complications*.—1, inflammation ; 2, gangrene ; 3, phagedæna ; 4, phimosis. In consequence of the liability to these, a classification has been made of soft chancres into—1, simple ; 2, phagedænic ; 3, gangrenous or sloughing. The phagedænic is characterised by unusually rapid, obstinate, destructive ulceration. Its form irregular, edges livid, surrounded by copper-coloured areola ; secretion thin, very offensive. Occurs in broken-down subjects. Gangrenous chancre is usually a consequence of phimosis with inflammation. The prepuce is the part which usually sloughs. Great hæmorrhage may occur. *Usual Positions of Chancre in Women*.—Just inside fourchette or labia minora. Sometimes on cervix or os uteri. *Diagnosis*.—From herpes, by the latter being, at most, an excoriation. From Hunterian chancre, by absence of characteristic induration, by state of inguinal glands, by more active character of ulceration, and by ulcers appearing immediately after exposure to contagion. *Prognosis*.—Bubo (suppurating) frequently attends or follows soft chancre, especially if chancre affect frænum, or be irritated. *Treatment*.—1. Of simple chancre : Restrict walking exercise. Low or moderate diet, cleanliness, wash with hot water twice daily, each time dressing with lint and lotio nigra (calomel 3j. ; aquæ calcis 3iv.), or blue-wash (cupri sulph. gr. j. ; aquæ 3j.), or, best of all, with iodoform. If seen in first week, cauterise with nitric acid. In later stage, when indolent, stimulation with ungu. hyd. oxid. rubri, or a touch of argent. nit., may do good. For painful erection at night, use morphia suppositories. When phimosis is present, before circumcising, try frequent hot injections beneath prepuce, rest, and elevation. 2. Phagedænic chancre requires generous diet, regulation of digestive and other systems, opium internally, and local caustic and antiseptic applications. Some sores can only bear non-irritant lotions, such as lead and opium. Change of air may act well.

Bubo.—See separate notice in alphabetical order. In addition to the notes given there, it may be stated that the bubo consequent on a soft chancre is itself a chancre of the gland affected. Matter from the interior of this suppurating gland will, when inoculated, excite a true soft chancre.

SYPHILIS (*true syphilis*) is either *acquired* or *hereditary*.

Acquired Syphilis.—Ordinary true syphilis. *Causes*.—Always contagion ; almost always direct contagion, *e.g.* impure sexual intercourse, kissing, nursing (*i.e.* suckling), unnatural offences, and sometimes, unfortunately, the performance of obstetric duties : by skin-grafting in one case (Deubel's), *Brit. Med. Journ.*, Dec. 17, 1881. The blood and other constituent fluids of a syphilitic patient are capable of syphilising by inoculation. But excretions of such a patient are innocuous. It is even stated, but not proved, that vaccine lymph can only transmit syphilitic poison when mixed with blood. As a rule it is probable that infants are not liable to be infected by the milk of a syphilitic mother. *See Clement Lucas, Medico-Chir. Proc.*, 1882, and *Lancereaux*.

Pathology and Semeiology.—In the progress of syphilis there are four periods, *viz.* :—1. Incubation. 2. Local eruption, or primary lesion. 3. General eruption, or secondary syphilis. 4. Gummy products or tertiary syphilis. 'Well-marked differences separate each of these periods ; in the first it is the complete absence of local manifestations ; in the second, the presence of a single unique modification of the tissues at the point of deposition of the contagious matter. Numerous but superficial lesions, which generally leave no appreciable trace of their passage, characterise the third (*i.e.* secondary) period ; while the fourth is distinguished by changes more deep-seated, and usually followed by cicatrices. Moreover, inoculable and hereditary in the second and third periods, syphilis does not appear to be contagious either in the first or in the last. (*Lancereaux*.)

Analogy points to the bacterial nature of the syphilitic virus. Moreover, Klebs, Aufrecht, and Birch-Hirschfeld have described organisms which they have found in primary indurations, condyloma-juice, and in gummata respectively. The investigations of Birch-Hirschfeld are very valuable, but not conclusive. Colonies of very short bacilli, sometimes mixed with larger ones, were found, not only in superficial syphilitic lesions, but also in gummata of the brain, liver, &c. The method employed was to harden in absolute alcohol, lay for a

short time in vinegar, and examine in glycerine. See *Lancet* Aug. 26, 1882.

Period of Incubation.—Three to five weeks.¹

Local Eruption (Primary Syphilis). Hunterian or Hard Chancre. Infecting Chancre.—Microscopically examined, every hard chancre evidently owes its hardness to cellular infiltration and consecutive formation of new fibrous tissue, and the ulceration is partly due to 'granulo-fatty metamorphosis' of the infiltration and of the infiltrated tissue.

Three kinds of hard chancre—1. Dry papuli. 2. Chancriform or chancrous erosion. 3. Ordinary Hunterian chancre.

Dry Papuli.—Very rare. 'A papular protuberance, usually having the form of a patch, one or more centimetres in extent, of a dark or brownish red colour, round or oval, firm and elastic, and sometimes covered with whitish scales, which give it a certain analogy with the syphilitic papules of the next' (i.e. secondary) 'period.'

Chancrous or Chancriform Erosion. Parchment-like Chancre of Ricord.—Usually occurs just behind corona glandis. When pinched up beneath the finger, it feels like a thin, hard wafer, or piece of parchment. Two such chancres out of three leave no permanent induration behind them.

Ordinary Hunterian Chancre not only has a hard base, but is surrounded by an elevated, hard, callous border, so that it is deeper in the middle than at the periphery. When the result of inoculation, its successive appearances have been observed to be as follow:—red spot, red or dirty yellow papule, covering of greyish scales, scales accumulated to a crust, finally a cup-shaped ulcer. Fully developed, its surface is indolent, glossy, lardaceous, and its secretion scanty, thin, degenerate, not pus, and not re-inoculable on the same subject. Usually heals after about six weeks. The characteristic hardness feels like half a split pea, and does not usually entirely disappear in less than four months; it may be permanent.

Seat of hard chancre is, in females, usually external genitals,

¹ In *vaccino-syphilis* the vaccine scar begins to show syphilitic signs, e.g. inflammation and induration, about a month after inoculation, in the meantime the pustule having followed quite a normal healing course.

rarely vagina, frequently uterine neck or os, sometimes quite other regions of the body. Often difficult to discover at all in women.

INDOLENT BUBO. TRUE SYPHILITIC BUBO.—Glands affected, always multiple, usually numerous. Surrounding cellular tissue not affected ; each gland is consequently distinguishable. Characters :—hardness, smoothness, oval or round shape, enlargement not great. Sometimes one gland much larger than rest. Never suppurates except under circumstances of special irritation. Appears coincidently with induration of chancre, and considerably outlasts it.

SUBSEQUENT INDURATION OF OTHER LYMPHATIC GLANDS, especially in nape of neck, axilla, and groin of opposite side, very frequent. This may last for years, and is valuable to assist in diagnosing a case where history of syphilis is not easy to get.

SECONDARY SYPHILIS. PERIOD OF GENERAL ERUPTION.—Often ushered in by feverishness, gastric disturbance, dizziness, pains in joints, lassitude. These symptoms have before now led to a false diagnosis of intermittent fever, typhoid, neuralgia, or rheumatism. The parts chiefly affected by secondary syphilis are—1, skin ; 2, mucous membrane ; 3, glands ; 4, iris and neighbouring parts of eye.

Skin Syphilides. Syphilitic Exanthemata.—Varieties :—1, erythematous syphilide ; 2, papular syphilide ; 3, pustular syphilide ; 4, vesicular syphilide ; 5, squamous, and 6, pigmentary syphilide. General diagnostic peculiarities of syphilides :—1, copper colour ; 2, pigmentary stains left behind ; 3, indistinctness of type (*e.g.*, in the same subject are seen transitional forms between roseola and psoriasis, and few or no patches which are distinctly either one or the other) ; 4, situation (*e.g.* syphilitic psoriasis is not confined to the knees and elbows, as is so often the case with simple psoriasis) ; 5, shape of groups of eruption, usually circular or crescentic ; 6, absence of itching ; 7, unusual thickness of crusts and scabs.

Erythematous Syphilide. Syphilitic Roseola.—Rose-coloured spots, or red and slightly raised patches. Generally commences on trunk. Course slow. In diagnosing from non-syphilitic

erythemas consider the history of the patient and the state of the glands. *Prognosis*.—Usually disappears under a month's mercurial treatment. Said to augur rather a mild attack of syphilis.

Papular Syphilide.—Coppery-red papules, chiefly on trunk, but also on limbs, forehead, and hairy scalp. Leaves no permanent scar.

Pustular Syphilide. *Syphilitic Impetigo*.—Appears at a later stage than the preceding syphilides, but not so late as syphilitic rupia, which, indeed, is a tertiary affection. The pustules suppurate, scab, and leave scars. It lasts for several months, and might at first be mistaken for small-pox, and, later on, for common acne.

Vesicular Syphilide.—Extremely rare.

Squamous Syphilides. *Syphilitic Psoriasis*.—Spots rarely large, colour coppery, scales thin. Fissures. Frequently palmar and plantar in situation. Palmar psoriasis characterised by 'slightly prominent rounded spots, of a coppery colour, covered with hard greyish confluent scales, which in some cases take the form of cracked patches, and give rise to chaps and fissures which are often painful.' Characteristic brown border at edges of patches.

Pigmentary Syphilide.—Greyish, or coffee-with-milk coloured patches, size of sixpence, chiefly on neck, face, and abdomen.

Alopecia.—'Primary' or 'consecutive.' By, 'primary' is meant the alopecia which occurs independently of any visible anatomical lesion during the secondary period of syphilis. 'Consecutive' is the alopecia which attends various local tertiary syphilitic affections. Very common indeed, especially in women. Not confined to crown of head, like senile alopecia. Affects scalp irregularly. When of long duration, indicates a severe syphilis.

Nails. Onychia.—Usually moist and ulcerative; sometimes dry, and co-existent with psoriasis elsewhere. Affects toes more than fingers. Part primarily affected is, of course, the matrix. Pain of ulcerative form often considerable. *Psoriasis of the nail* makes it horny, thickened, and fissured.

Mucous Membranes.—Especially of mouth, throat, nose, larynx and rectum. Secondary affections of these are either—(1) erythemas, (2) superficial ulcerations, or (3) condylomata. Type, *Syphilitic Sore-throat* (secondary).—Red patches, more or less irregular, on pharynx, soft palate, and often at same time on mucous membrane of cheeks. These may be attended or followed by small superficial ulcers, surrounded by a dark red margin, covered with yellowish material, and tender, readily smarting. Must not be confounded with mercurial stomatitis and angina. The latter produce swelled gums and the odour of salivation. The throat, in the male sex, is the commonest seat of condylomata.

Condylomata. Mucous Tubercles.—Chief seats: vulva, pharynx, palate, mouth, anus, buttocks, glans penis, prepuce, scrotum, and intervals between toes. Structures: sarcomatous, or soft connective tissue. *Prognosis*: they indicate a mild form of syphilis.

Secondary Visceral Affections.—Of liver, nervous system, &c., gummatous, scleroses, locomotor ataxia, &c. (See medical works.) Secondary affections of the *joints* occur rarely, and may be diagnosed by the history. Secondary thickenings of the *muscles* and of the *periosteum* are very uncommon.

Iritis.—For diagnosis of syphilitic from rheumatic iritis, see notice of *iritis* in Appendix on Diseases of the Eye.

Course and prognosis of syphilitic iritis depend greatly upon whether the affection develops early or late during the secondary period. In the latter case, adhesions usually form between iris and capsule of lens, which keep up an irritation apt to lead to choroiditis, retinitis, and permanent impairment of vision.

PERIOD OF GUMMY PRODUCTS. TERTIARY SYPHILIS.—In the preceding paragraphs 'we saw the morbid localisation of syphilis limited chiefly to the skin, to some of the mucous membranes, and to a small number of the organs,' *e.g.* the eye; 'from this time syphilis extends its manifestations beyond these limits, and we find it everywhere where a web of connective tissue exists, that is to say, in all parts of the body.' 'It is no longer simple hyperæmias with or without exudation,

inflammations slight and of short duration, but profound changes essentially slow in their evolution, and marked by chronic inflammations. Sometimes extensive and disseminated in a single organ, they are rather comparable to the chronic phlegmasiae ; sometimes more limited and circumscribed, these changes appear in the form of nodules or tubercles, and it is then that the name of Gummy Tumours is more particularly reserved for them.' These two anatomico-pathological varieties, differing only in form, have the same starting-point and the same structure. Tertiary syphilis is usually separated by a distinct interval of time (sometimes many years) from secondary syphilis. And its own manifestations, in some cases, show a tendency to appear in a certain order, viz. : first, deep-seated lesions of the skin ; secondly, affection of the subcutaneous cellular tissue, muscles, and bones ; thirdly, disease of the viscera. The peculiarities of tertiary syphilis of the special organs and parts are described under the corresponding headings, *e.g.*, BONE, TONGUE, LARYNX, RECTUM, TESTICLE, ULCERS, &c. It may be stated here that tertiary syphilis attacks the skin as rupia and ecthyma ; and that the great cachexia often observed at this stage is sometimes due to disease of the abdominal absorbent glands. *Structure of a Gumma.*—Primarily, granulation-tissue, with a delicate stroma of fibres and a few blood-vessels. Afterwards, partly degenerates into a granular detritus. Gummata eventually show, in consequence of degenerative changes, 'three fairly distinct zones : an internal, composed of fatty and granular débris devoid of vessels ; a middle one, where the cells are round and oval and undergoing atrophy ; and an external, highly vascular and exudative. No hard and fast line is to be drawn between these zones.' 'An old gumma appears to the naked eye as a greyish-yellow mass, surrounded by a zone of fibrous tissue.'¹ The naked-eye appearance has been well compared to boiled codfish, but it sometimes really resembles a solution of gum.

Prognosis.—Certainly is affected for evil by bad nourishment, want of cleanliness, changeable climate, damp, darkness,

¹ Pepper's *Pathology*, p. 144.

very early age, and originally feeble constitution. Some cases are manifestly bad, others as plainly benignant from the first. Indications may be drawn from the character of the prime lesion. Very indurated, and, still more, phagedænic chancres are of evil omen. 'The first syphilide,' according to Diday, 'is the most valuable sign to rely upon.' With a trivial roseola, not showing any tendency to become papular, spontaneous cure is almost certain. Papular, squamous, pustular, and vesicular syphilides indicate probability of a worse attack of syphilis. 'Syphilis once, syphilis ever,' is the teaching of an influential body of pathologists who have yet to prove their thesis. Numberless instances have been observed of syphilitic patients who during the remainder of a lifetime have enjoyed sound health, and begot families of vigorous, apparently untainted children. Also, a second and even a third infection are not unknown.

Treatment.—Public prophylaxis. Registration and periodical inspection of prostitutes. In some Continental towns, males who visit immoral houses are also inspected. Private hygiene: none thoroughly effective except morality. Cleanliness, &c. Potash soap. Oil of eucalyptus. History of treatment of syphilis may be divided into three main periods: the first, when mercury was almost all in all, being rivalled only by guaiacum, sarsaparilla, and other vegetable diaphoretics; the second period, when the still powerful school of anti-mercuroialists had its origin in the experience of the British army surgeons during the Peninsular war; and the third and present period, in which nine surgeons out of ten give mercury, with discretion both as to amount and time, and frequently substitute for it iodide of potassium. Practically convenient to notice treatment of primary, secondary, and tertiary syphilis independently.

Primary Syphilis.—Sigmund's statistics tend to prove that cauterisation of the spot inoculated is very successful in averting, if only it be effected early in the period of *incubation* (before any chancre has appeared).¹ Excision of the chancre is justifiable if done quite early, and especially if the chancre be

¹ Sir James Paget and Mr. Hutchinson are in favour of trial of cauterisation in early stage of hard chancre.

conveniently placed, *e.g.* altogether on the prepuce. Mercury usually unable to prevent secondaries, but useful to hasten the absorption of a very indurated chancre which is slow to disappear. Still it should be given as soon as ever syphilis is diagnosed or reasonably suspected. For modes of administration see next paragraph. Locally, cleanliness and lotio nigra, or calomel ointment one part + simple ointment four parts, or iodoform. For treatment of phagedæna, see SOFT CHANCRE.

Treatment of *secondary syphilis*.—General and local. General : Mercury in small doses, *e.g.* hydrarg. c. cretâ gr. iij. bis die; calomel gr. ij. with opii gr. $\frac{1}{2}$ ter die ; hydrargyri iodidi virid. gr. ij. ter die ; pil. hydrargyri gr. v., opii gr. $\frac{1}{2}$ bis die ; liq. hydrarg. perchlor. 3j. ter die. Mercurial inunction, ung. hydrargyri 3ss.—3j., rubbed into skin of inner side of thighs, arms, and of belly alternately every evening ; or placed on soles of feet and 'walked' in. Mercury makes with vaseline a very clean ointment which is easily washed off. Peroxide of mercury dissolved in olive-oil is another 'elegant' preparation for external use. Fumigation.—Apparatus required : spirit lamp, common tin plate, small tin for boiling water, tripod to support tin plate over spirit lamp, cane or wood bottomed chair and blanket. Calomel gr. xx. to be placed on plate dry. Tin of boiling water to be put on plate beside the calomel ; lamp lighted, patient sits on chair with blanket round him. Lamp to be extinguished in ten minutes ; but patient sits a quarter of an hour longer, and then gets into bed without drying his skin. Repeat every night or every other night. Iodide of potassium often given in secondary syphilis. Dose v.-xx. grains, best combined with some alkali.¹ Iodide of potassium and liq. hydrarg. perchlor. sometimes prescribed in same mixture, especially in scrofulous subjects. Red or periodide of mercury results. Mercury usually given cautiously till the gums become slightly touched, and then stopped temporarily. A course of mercury, in small doses, should be continued for a whole year. It should usually be combined with iron ; and, especially when the mucous membranes are affected,

¹ The unpleasant taste is completely disguised by milk (*see* Keyes, *Annals of Surgery*, Oct. 1885).

A long course of mercury in small doses, so far from injuring the general health and nutrition, often seems to improve them.

Bumstead and Taylor recommend the following as a valuable adjuvant to a mercurial course:—R. Extr. erythroxyli cocæ liq. $\frac{3}{4}$ ij., Tinct. cinchonæ co. $\frac{aa}{3}$ j., Tinct. gent. co. $\frac{aa}{3}$ j., M. $\frac{3}{4}$ ij. in aquæ $\frac{3}{4}$ jss. ter. die (after meals).

Syphilis, Hereditary (Congenital Syphilis).—In hereditary syphilis the foetus either (1) dies early in utero, abortion taking place, or (2) is born alive prematurely, or (3) is born dead at full term, or (4) is born apparently healthy, the disease manifesting itself afterwards. The more recent the syphilis in the parents the greater the danger to the infant. In the case of syphilis of the placenta the foetal portion is much more commonly affected than the maternal. Gummata are found therein in the form of yellowish-white tubercles. Hennig showed their intimate relation to the vessels. The obliteration of the vessels, if extreme, interferes with aeration of the foetal blood, thus producing death of the foetus (Frankel, quoted by Bäumler). Infants with congenital syphilis are generally in

appearance old, small, and shrivelled. They have *snuffles*, i.e. nasal catarrh, and *eruptions*. These, usually papular or roseolar, are sometimes bullæ, but rarely pustular, and very rarely vesicular. Bullæ (*pemphigus neonatorum syphiliticus*) occur especially on palms and soles. This is a point in diagnosis. *Mucous tubercles* at corners of mouth and eyes, in flexure of limbs, on neck and behind ears. Characteristic eruptions are very copper-coloured. Stomatitis. Mucous tubercles in mouth throat, and larynx. Iritis sometimes, especially about fifth month. Deafness occasionally. *Osteo-chondritis*.—Important diagnostically, because it is often the only pathognomonic symptom. It is caused by syphilis exclusively. Affects chiefly epiphyses of long bones—femur, tibia, humerus, &c., clavicle, sternum, ribs. Epiphysial cartilages swell, and can be felt projecting as would a ring round the bone. The swelling is usually smooth. Little or no pain or interference with movement. Occasionally causes ulceration and necrosis. Is commonly symmetrical. Leaves no ill-effects if resolution takes place quickly. Otherwise may permanently affect growth of limb. Period of its occurrence, usually at birth or during first month. For a very full account read Bumstead and Taylor. But Wegner, of Berlin, first described it. Contrast with 'Scurvy of Infants,' *q.v.* *Spleen* is enlarged in at least fifty per cent. of cases, and often accompanied by hypertrophy of liver (Gee). *Later effects*.—About period of second dentition, or about puberty (in girls especially), appear interstitial keratitis and choroiditis, serpiginous ulcerations, eruptions almost rupial in character, ulcerations of throat and hard palate, nodes, affections of viscera; and certain nervous affections, especially epilepsy, chorea, and even paralyses (Hughlings Jackson). The characteristic signs present at this period, besides the manifestations just mentioned, are certain relics of infantile syphilis, viz., flattened nose, projecting forehead, dull-coloured skin, lines about the corners of the mouth, and '*Hutchinson's teeth*.' The peculiarities of the last are due to stomatitis in infarcty; therefore, if the syphilitic infant escape stomatitis, it will escape teeth-deformity. The upper front permanent teeth are the most peculiar, the central incisors especially. These

converge towards each other, are dirty-looking, imperfectly covered with enamel, often small and short, and are either notched or pegged on their cutting edges. *Prognosis*.—Depends mainly on the severity of the symptoms. The worst cases usually die. But most infants and adolescents (especially the former) with inherited syphilis are strikingly amenable to treatment. *Treatment* is to be conducted on exactly the same principles as that of acquired syphilis, *q.v.* Children readily take hyd. c. creta, or respond to mercurial inunction. Always add iodide of potassium when bone is affected, and in the later manifestations.

Syphilis, Vaccino.—The chief practical points connected with this subject are that (1) the child from whom the lymph is taken should not be less than four months old; (2) the lymph first drawn from the pustule should be used; (3) it should be clear, entirely free from any perceptible admixture of pus or blood; and, of course, (4) the appearance and history of the child and its parents should be unimpeachable. But Keber, of Dantzig, has shown that even clear vaccine lymph contains pus and blood-corpuscles, and in a small proportion of infants (5 in 158, Diday) congenital syphilis does not show itself till later even than the fourth month. Lymph from the calf is much more likely (according to some certain) to be free from any taint of syphilis. When syphilis is communicated by vaccination the pock runs its normal course, and no sign of specific infection appears till about the twenty-eighth day. Refer to Hutchinson's *Illustrations of Clinical Surgery*, fasc. vi.; and to Hugh Thompson, *Glasgow Med. Journ.*, 1879.

Talipes. *See CLUB-FOOT.*

Tarsus, Disease of, usually begins in the bones. *Diagnosis*.—From disease of the ankle-joint by the swelling being below the malleoli in affection of the astragalo-calcaneal joint, and by the motion of the ankle-joint being comparatively free; of course disease of anterior part of tarsus is easy to distinguish from ankle-joint disease. Diagnosis of exact tarsal joints and bones affected very important from its bearing on treatment. When the swelling, tenderness, &c., are on the outer side of the foot, whether affecting os calcis, or cuboid, or both, if disease be

inveterate operative treatment is decidedly indicated. But when disease affects scaphoido-cuneiform joints, and centre of tarsus, the necessity of amputation is to be feared. Excise for disease of astragalus, or astragalo-calcaneal joint. Disease of os calcis usually confined to bone, not reaching any joint for some time. It should be gouged or scraped out. If the general tarsal synovial membrane is affected, excision of the middle cuneiform may give room enough to use the erosion-spoon effectively. Antiseptics of course. Iodoform. In early stages, rest, pressure, &c., combined with outdoor exercise, indicated. A high heel should be placed on the sound foot, a plaster of Paris bandage on the diseased one, and the patient sent about on crutches. (*Vide BONE, SCROFULA, &c.*) Sometimes a kneeling leg is fixed to the knee of the affected side.

Tendo Achillis, Resection of.—An operation done for paralytic talipes calcaneus. A piece of the tendon is removed, the ends approximated and spliced. Thus the tendon is shortened and the heel braced up. See Willett, *St. Barth.'s Hosp. Rep.*, 1880.

Tendons, Ruptured, should be treated like ruptured muscles. Rest in relaxed position for a fortnight. Afterwards careful and gradual motion for weeks before attempting free use.

TENDONS, CUT, can often be advantageously united by suture.

TENDONS, SYPHILITIC GUMMATA OF, occur.

TENOTOMY. *See 'Club-foot,' 'Hamstrings,' &c.*

Testicle.—Abscesses ; Absence ; Atrophy ; Cancer ; Cystic disease ; Development imperfect ; Enchondroma ; Fibrous and fibro-cystic tumour ; Hernia testis ; Inflammation (orchitis and epididymitis) ; Injuries ; Malposition,—Inversion, Testicle in perineum, Testicle in groin below Poupart's ligament, Retained testicle in abdomen, in inguinal canal ; Neuralgia ; Scrofulous testicle ; Syphilitic testicle.

TESTICLE, ABSCESS OF.—*Causes.*—Generally, chronic or subacute orchitis, of syphilitic or scrofulous origin. *Occasional Results.*—Hernia testis, troublesome sinuses, and recurrent inflammations. *Treatment.*—Apply general principles. Do not open too early.

TESTICLE, ABSENCE OF.—An extremely rare condition, except in cases of general abnormality of the genital organs. Curling quotes trustworthy case from the practice of Page, of Carlisle.

TESTICLE, ATROPHY OF.—*Causes.*—1, the contraction of lymph effused in the course of any variety of orchitis ; 2, similar contraction the result of haematocele, and even of hydrocele ; 3, excesses, sexual or alcoholic ; 4, varicocele ; 5, operations for varicocele, especially those in which the spermatic artery is injured ; 6, elephantiasis scroti ; 7, injuries of the head ; 8, injuries of the spine ; 9, blows on the back of the neck ; 10, old age. *Treatment.*—Remove the cause if possible ; use means to excite the arterial circulation in the part, and to support the veins. Attend to general health. In some cases rest, in others exercise of the genital organs will be indicated. *Prognosis* depends on cause and persistence. In genuine cases, bad.

TESTICLE, CANCER OF.—Almost always encephaloid. *Pathology.*—Begins usually in the body of the testis. At first the tubular structure of the testicle is spread around the cancerous mass, not mixed with it. Cancerous mass is soft and pulpy, generally whitish in colour : cystic, cartilaginous, and fibrous masses occasionally interspersed. Growth usually rapid. Very little tendency to ulcerate through skin. Great tendency to infection of lumbar glands. Secondary formations occur in lungs and elsewhere. Inguinal glands sometimes affected. *Signs.*—A solid enlargement of the testicle progressing rapidly, without inflammation, is almost always cancer. Testicle smooth, and firm, till localised softening occurs. Pain, dull. Special testicular sensation no longer evolved by pressure. Cord not affected early. General health perfectly good at first. *Diagnosis.*—The first thing is to make sure that the enlargement is solid. A trocar will settle this in doubtful cases. (*Vide HYDROCELE.*) Next, a diagnosis has to be made from orchitis, syphilitic, scrofulous, or simple. History, concomitant symptoms, and the effect of mercury, iodide of potassium, &c., help to decide this. ‘The diagnosis from cystic disease may be based partly upon the rate of growth, but

especially upon the information elicited by the trocar' (Humphry). *Prognosis.*—Usually fatal in one and a half to two years. Many cases of removal without recurrence have been recorded. *Treatment.*—Unless the disease has spread to the abdomen, remove the testicle.

TESTICLE, CYSTIC DISEASE OF.—*Pathology.*—A tumour consisting of multitudinous cysts, of any size up to that of a walnut, with thin walls, lined by tesselated epithelium, and containing fluid varying in consistence from that of serum to an almost gelatinous thickness. At least three views as to the origin of the cysts, viz. : (1) dilatation of tubuli seminiferi, (2) dilatation of tubules of rete testis, (3) a fibrous or fibro-cartilaginous tumour in the testicle, with more or less of cyst-formation in the tumour. The cysts are sometimes 'proliferating,' containing fibrous or cartilaginous masses. *Symptoms and Diagnosis.*—Negative symptoms, such as absence of pain, of thickening of the cord, of inflammation, and of constitutional disease, together with positive symptoms, such as smoothness, oval or spherical form, and slow growth, generally reduce the final diagnosis to a distinction from hydrocele or hæmatocoele. Cystic disease is heavier than hydrocele, fluctuates less, and is non-transparent. Moreover the testicular sensation usually remains and is diffuse, owing to the glandular substance being present on every side of the tumour. In hydrocele and hæmatocoele this sensation is, of course, confined to the seat of the testicle. A good-sized trocar is usually employed to settle the question. *Treatment.*—Castration. But, if a patient has only one testicle, a less radical operation may be considered. Professor Humphry recommends in that case that the tubular structure of the testicle should be pulled off the capsule of the growth and be preserved.

Note.—Cystic disease is sometimes associated, not only with enchondroma, but with recurrent sarcoma and with soft carcinoma.

TESTICLE, IMPERFECT DEVELOPMENT OF, may occur, affecting either the body of the gland, or the epididymis, or both. So also part of or even all the vas deferens may be absent, the testicle being present and even full-sized. Such cases

may be virile, though necessarily sterile. Another form of imperfect development will be noticed under heading Malposition.

TESTICLE, ENCHONDROMA OF.—Usually associated with cystic disease, sometimes with soft cancer, the small masses of cartilage growing into the cysts. ? as to whether growths commence in lymphatics or in tubuli of the gland. Appearances, naked-eye and microscopic, much like those of hyaline cartilage.¹ *Diagnosis.*—Characteristic weight and hardness. *Treatment.*—Excision.

TESTICLE, FIBROUS AND FIBRO-CELLULAR TUMOURS OF.—Very rare. Refer if necessary to Curling or Humphry.

HERNIA TESTIS, the condition in which, as a result usually of abscess, but sometimes of wound, the whole or a part of the tubular part of the gland escapes through an aperture in the tunica albuginea, and through a corresponding opening in the scrotum. Any form of chronic orchitis may lead to hernia testis. The projection looks like a mass of granulations. Both the tubuli and the margins of the opening through which they protrude are thickened by fibrous deposit. *Treatment.*—Cleanliness, rest, unguent. hydrargyri oxid rubri or ungu. hydrarg. nitrat. locally, or strapping, combined with appropriate general treatment, usually cause the skin to cicatrize over. In more obstinate cases try incision of constricting edge of tunica albuginea (Pagan of Glasgow), or, after slitting up all sinuses, the edges of the skin wound may be freshened and brought together over the protrusion (Syme). Anything like paring off protrusion rarely necessary and usually mischievous.

TESTICLE, INFLAMMATION OF (Orchitis and Epididymitis).—*Varieties.*—1, Acute; 2, chronic. A list of sub-varieties might be made out, founded on the aetiology, e.g., gonorrhœal, traumatic, syphilitic, scrofulous, metastatic, &c. *Vide* STRUMOUS TESTICLE and SYPHILITIC TESTICLE.

Acute Orchitis (Inflammation of the body of the testicle).—*Causes.*—Blows, wounds, metastasis (mumps), and rheumatism.

¹ Mr. Savory once observed of a section of a lovely specimen, 'Like pearls, only more precious.'

Also occasionally a sequel of continued fevers. (C. E. Harrison, *Lancet*, June 9, 1883.) *Symptoms*.—Ordinary signs of inflammation, viz. pain, tenderness, heat, redness, swelling. Effusion into tunica vaginalis. When accompanying mumps, it begins about fifth or sixth day. *Treatment*.—Rest, suspensory bandage, cold lotions, aperients, antimony (Antim. tart. gr. j., aquæ fervent. $\frac{3}{2}$ viiij. ; $\frac{3}{2}$ j. 4th horis). Ol. santalini. Leeches: they should be placed over the cord (Humphry). Puncture of tunica vaginalis, or even of testicle, with a sharp, narrow-bladed knife. Treat gonorrhœa also, if present.

Acute Epididymitis.—Frequently, though not quite accurately, termed 'acute orchitis.' *Causes*.—Mostly gonorrhœa. Any urethral irritation, e.g. stricture, catheterisation, lithotomy, impacted calculus. Blows. Rheumatism, gout. Epididymitis may supervene during any stage of a gonorrhœa. *Symptoms*.—Tenderness, pain, swelling, and hardness of epididymis. Effusion into tunica vaginalis. Skin reddened and tender. Constitutional disturbance, fever, sickness. Resolution usually commences within a fortnight, but thickening may persist for months. *Treatment*.—See ACUTE ORCHITIS. Worth while to persist with treatment in order to remove the residual thickening, as the latter, if left, may interfere with function of testicle. Suspensory bandage, moderation in all things, and pot. iod. internally.

Chronic Orchitis.—*Causes*.—(1) Acute orchitis; (2) syphilis; (3) struma; (4) injuries. Acute inflammation in the testicle, as elsewhere, sometimes subsides into chronic. Most cases of chronic orchitis are syphilitic, and very indolent. See STRUMOUS TESTICLE, and SYPHILITIC TESTICLE. The treatment for syphilitic is adapted also for non-specific, chronic orchitis.

TESTICLE, INJURIES OF.—Blows cause intense shock. Mobility of testicle and strength of tunica vaginalis greatly protect testicle. Extravasation into cord may extend up to kidney, or even higher. Chronic, and, more rarely, acute orchitis may supervene. This orchitis may hopelessly damage organ. *Treatment*.—Apply general principles. Testicles bear incised wounds well. Recovery from self-mutilation usually rapid.

TESTICLE, INVERSION OF.—When testicle lies in front of, instead of at back of, scrotum, it is liable to be injured in tapping a hydrocele.

TESTICLE, OTHER FORMS OF MALPOSITION OF, are known, as—1, retained testicle ; 2, descent of testicle into perinæum ; 3, descent of testicle into groin. The testicle in the perinæum is liable to injury, especially during riding. Operations to restore it to the scrotum have been performed by James Adams and by Annandale. An undescended testicle may remain above the internal abdominal ring, or may enter the inguinal canal. Size and maturity of gland then sometimes imperfect ; but impotence not necessary, and perhaps not usual even when both glands are retained. Liability to certain accidents, *e.g.*, (1) inflammation, which may be confounded with strangulated hernia or with bubo ; (2) attacks of severe pain owing to testicles being suddenly 'trapped' between abdominal fasciæ ; (3) encysted hydrocele ; (4) complication with congenital hernia, frequent. Excessively troublesome testicles in inguinal canal have been excised. *Treatment.*—When a hernia adherent to testicle threatens to descend with it, both had better be kept in abdomen by a truss. When a non-adherent congenital hernia exists, apply a truss above testicle and below hernia ; or, if testicle is still in abdomen, dispense with truss for a while in the hope that it may descend. Be in no hurry to operate upon a hydrocele of the testicle in the inguinal canal. Remember that tunica vaginalis cavity usually in these cases communicates with that of peritoneum.¹

TESTICLE, NEURALGIA OF (with which may be associated 'irritability,' or 'hyperæsthesia,' or tenderness of the testicle ; although this condition may exist separately). *Causes and Pathology.*—(1) Reflex ; (2) the obscure state of the nerves and vessels of a part commonly associated with neuralgia elsewhere, and manifested chiefly by signs of congestion ; (3) in some rare cases, the presence of coarse organic disease, *e.g.* chronic abscess (*vide* specimen in Hunterian Museum) ; (4) malaria. Reflex neuralgia results from stone in the bladder or kidney, from varicocele, indigestion, &c. The age most subject is the

¹ Refer to Royes Bell, *Lancet*, Feb. 4, 1882.

period of puberty, and the next ten years. The exciting cause, frequently, undue excitement of the genital organs. *Prognosis.*—Time almost invariably works a spontaneous cure, both of the individual attack and of the disposition to it. Remove the cause. Treat varicocele, indigestion, &c. Suspensory bandage,¹ cold bath, moderation in diet and in exercise of gland, &c. Quinine for intermittent cases. Hypodermic injection of morphia (quarter-grain). Horizontal position, or elevation of pelvis and lower extremities.

SARCOMA OF THE TESTICLE.—Round-celled frequent in childhood or advanced age. May attack both testicles. Secondary affections chiefly in bones and skin, but also in glands. Spindle-celled the usual form of sarcoma in middle-aged patients. *See TUMOURS.*²

STRUMOUS TESTICLE.—*Causes.*—*Vide SCROFULA. Pathology.*—A deposit of tuberculous matter takes place within the convoluted tubes of the epididymis. This matter is probably at first mainly a collection of epithelial cells. Subsequent change into a cheesy, or into a calcareous mass. In the meantime chronic inflammation tends to destroy the walls of the tubes, and to connect the tubercle into one mass. Colour of tubercle, white, or yellowish-white. Disease usually begins in epididymis, but when it commences in the body of the gland, small scattered grey tubercles first appear. These enlarge, and coalesce in parts of the gland. The ordinary processes of chronic inflammation occur around the deposits. These usually result in formation of abscesses and sinuses. Vas deferens usually thickened. Both testicles often affected. Coincident disease of lungs frequent, and of kidney, prostate, vesiculae seminales, &c., occasional. *Signs.*—Epididymis, and sometimes body of gland, enlarges slowly; very little pain except when an abscess is ripening. Formation of abscess. Thickening of vas deferens. Scrofulous appearance of patient. Sometimes coincident disease of lungs, &c. *Prognosis.*—With suitable treatment, many cases make a satisfactory recovery, the tubercle degene-

¹ See VARICOCELE.

² See Butlin on Sarcoma and Carcinoma. For a case of Sarcoma of the epididymis (very rare), *see* F. S. Edwards, *Path. Trans.*, vol. xxxiii.

rating and becoming encapsuled, or discharged. *Treatment.*—*Vide SCROFULA.* Suspensory bandage, cold sponging in indolent cases, iodine externally. Lay open, scrape, and iodoform obstinate sinuses. Only in thoroughly hopeless cases, such as resist treatment and obviously undermine the health, is excision justifiable. *Vide HERNIA TESTIS.*

TESTICLE, SYPHILITIC.—A tertiary manifestation. *Pathology.*—(Compare with STRUMOUS TESTICLE. See above.) Generally confined to body of gland, epididymis and cord remaining healthy. Deposit of lymph in areolar tissue between the tubercles, sometimes in nodules. Different lobules affected in different degrees usually. Lymph-nodules upon tunica albuginea. Disease sometimes spreads to tubuli. Tendency to fibrous degeneration, eventual contraction, and even atrophy of the affected gland. Both testicles often attacked, usually one after the other. Liability to abscess and hernia testis. *Symptoms.*—Enlargement, usually slow. Amount of pain depends directly on rapidity of progress. Frequently neither pain nor tenderness. Stony hardness. Knotty feel (not always). Epididymis not usually distinguishable from rest of gland. Hydrocele often co-exists. History of syphilis : perhaps other collateral symptoms, e.g. nodes. *Diagnosis.*—Compare symptoms, as given above, of strumous testicle. Chronic orchitis caused by injury, or by stricture, can scarcely be distinguished from syphilitic, except by the history and general symptoms. But it requires similar treatment. *Prognosis.*—Danger of atrophy. Liability to relapse. Quite under control of antisyphilitic remedies. *Treatment.*—Support by strapping may be employed, unless suppuration be progressing. Suspensory bandage. Iodine or mercurial ointment locally when pressure is not advisable. Open abscesses early. Give iodide of potassium internally, or order mercurial inunctions. *See SYPHILIS.*

Tetanus.—*Causes*—1, wound ; 2, catching cold. Negro race and male sex predispose. Wounds in which nerves are lacerated or left in contact with sharp spiculæ of bones or with foreign bodies, and wounds of the hand or foot, are said to be especially liable. Tetanus is a more common complication of

compound fractures than of surgical operations. Exposure to cold or sudden change of temperature rarely acts without a pre-existing wound. *Pathology.*—Richardson, Billroth, and others teach that it is a zymotic disease, *i.e.* a poisoning of the blood through the absorption of septic material, which septic material is formed by decomposition in the wound.¹ Brown-Séquard and many others regard tetanus as an affection of the spinal cord which has spread from some irritated sensory nerve or nerves in the wound when there is one. In favour of the latter theory may be cited cases in which the spasm has been confined to the injured side of the body, or even to the injured limb itself. One naturally asks: 'Was this tetanus at all? Often no post-mortem appearances have been seen in the cord; sometimes softening of the central grey matter. It has been truly observed that great changes ought not to be expected, because 'it would be quite impossible for motor impulses to originate from a spinal marrow reduced to a mass of débris.' Coats (see *Med.-Chir. Trans.*, vol. lxi.) observed changes in medulla oblongata like those in cord, and even a morbid condition of the motor regions of the convolutions. There was an accumulation of leucocytes round the vessels of the medulla of the cord, and of the kidneys, which in his opinion supported the theory of a poison circulating in the blood. Shrinking of some of the ganglion cells of the anterior cornua (Harris and Doran). Rosenbach has apparently succeeded in inoculating guinea-pigs with tetanus. Dogs are proof against tetanus infection. Both Rosenbach and Nicolaier describe a bristle-shaped bacillus. (See report of last year's German Surgical Congress.) *Symptoms and Course.*—Typical case: A man with compound fracture of forearm, about three or four days after the accident, complains of pain in the part, and is rather feverish. The next morning his neck is stiff and his jaw also; he thinks he has caught rheumatism in that region. Within twenty-four hours short spasms of the back occur when the patient is momentarily exposed or fed or otherwise excited. The spasms rapidly affect also the abdomen and the extremities; and now, instead of being merely

¹ See also Abernethian Soc. Trans., *St. Barth.'s Hosp. Rep.*, 1882, p. 399.

transitory as at first, they never wholly pass away, the abdomen feels hard like a board, the back is arched (opisthotonus), the hands are clenched, the face marked by the *risus sardonicus*, and the jaw much more fixed than before. Skin bathed in perspiration. Temperature raised to about 100°. Bowels constipated. Respiration impeded by stiffness of respiratory muscles (chest feels 'as if in a vice'), intellect quite clear, no sleep; pain in the muscles, becoming intense when the spasms are aggravated. Slight noises, draughts, and other trifling irritants cause the tetanic spasms to be suddenly trebled in force. During one such paroxysm, patient dies asphyxiated. Or he lingers on for a few days or a week, and perishes of gradual asphyxia (carbonic acid poisoning) or of exhaustion. Such is the course of acute tetanus, and traumatic tetanus is usually acute. But the disease is sometimes chronic, especially if it be idiopathic. Then all the symptoms are less severe, the patient is able to take a fair amount of nourishment, and get some sleep. His breathing is not seriously interfered with, and he has considerable chance of recovery. There are intermediate grades of severity of every shade. Expression of face called *risus sardonicus* arises from contemporary spasm of all the muscles of the face—dilators, compressors, levators, depressors. Thus every line is deepened and every feature fixed by its muscles, just as a ship's mast is by its stays. This expression may persist long after otherwise perfect recovery. Sometimes the trunk is arched forward (emprosthotonus) or sideways (pleurothotonos).

Tetanus Neonatorum is attributed to the wound caused by dividing the umbilical cord. It is first observed by the mother or nurse in consequence of the lock-jaw preventing entrance of finger or nipple into mouth. Almost always fatal.

Diagnosis of tetanus.—From (1) strychnia-poisoning, (2) hydrophobia, (3) hysteria, (4) rheumatism. Strychnia-poisoning is much more rapid, both in its onset and in its advance to a fatal result. The paroxysms of spasm are interrupted by periods of complete relaxation. Hence there is no continuous lock-jaw. Death almost always takes place within two hours,

at latest. In tetanus, the most rapid death on record was after four hours' duration. Hydrophobia. See following table (abbreviated and slightly modified from Poland):—

TETANUS.	HYDROPHOBIA.
1. Spasms continued (tonic).	1. Intervals of complete relaxation (spasms clonic).
2. Cause—wound, or exposure to cold.	2. Bite of a rabid animal.
3. Appears generally soon after injury.	3. Period of incubation usually a month or more.
4. Ritus sardonicus.	4. Countenance expressive of excitement, fearful distress, and peculiar restlessness; occasionally frightfully convulsed; eyes bright and glistening, but at times suffused.
6. Frequently gastric pain, but no vomiting.	5. Thirst; often aversion to fluids; discharge of viscid saliva.
	6. Vomiting and gastric pains.
	7. Mind becomes delirious.
	8. Intolerant sensibility of surface and organs of sense.

Prognosis.—Acute traumatic tetanus almost always fatal. Subacute traumatic tetanus often recovers, especially if it does not appear till some time after the wound, and progresses slowly. The prognosis is favourable according to the duration of the disease. Thus a tetanus which has endured three weeks is extremely likely to recover. Idiopathic and chronic tetanus have a favourable prognosis. The longest duration of any recorded fatal case has been thirty-nine days. *Treatment.*—Remove every source of excitement, keep the room dark and silent, lay down thick carpets, protect from draughts by screens. Cover the patient with light, warm clothing, so as to encourage copious diaphoresis. Examine the wound very carefully if one exists. Remove any foreign body or splinter. If a nerve is believed to be irritated, a portion of its course may be excised. Those who regard tetanus as a septic poisoning would be justified in taking measures to make the wound aseptic. Prophylactic value of antiseptic treatment very great. Amputation has been done. Many drugs have been tried, chiefly anodynes and anti-spasmodics. Most surgeons now choose between chloral, morphia subcutaneously, opium internally, and Calabar bean. Curare. Chloroform. Quinine. Ice-bags to spine. Of Calabar bean, Garrod writes: 'In tetanus, enough must be given to produce the physiological symptoms of the drug. $\frac{1}{2}$ -grain

of the extract, rubbed up with 10-15 minims of water, and neutralised with a little carbonate of soda, may be injected every two or three hours subcutaneously, where swallowing causes pharyngeal spasm. If given by the stomach, 1 gr. of the extract rubbed up with a little weak spirit. According to Fraser, Calabar bean should be given at the very onset of the attack, for the contraction of muscles begets a substance which excites muscular contraction. When Calabar bean is given its action should be carefully watched, lest the respiratory muscles become paralysed by it. Rational indications, derived from the post-mortem evidences of hyperæmia, &c., of spinal cord, are to give belladonna, and to employ every available means of diminishing spinal congestion (Fitzgibbon, *Dublin Med. Journal*, March, 1877). The patient should be frequently fed with milk and the strongest beef-tea. Tracheotomy has been recommended when there is a tendency to laryngeal spasm.

Thoracic Duct, Rupture of.—A rare accident, but occasionally caused by blows, stabs, gunshot wounds and erosion (by suppuration). Results in chylothorax, chylous ascites, &c. Refer to Kircher, *Arch. f. klin. Chirurg.* 1885.

Thorax. *See CHEST.*

Thrombosis. *See VEINS.*

Thumb may be bifid, or it may be double.

THUMB, DISLOCATION OF. *See DISLOCATIONS.*

Thyroid. *See BRONCHOCELE.*

Thyrotomy. *See LARYNX, FOREIGN BODIES IN.*—The operation is simple. The incision should be strictly median. *See also Holmes, Med.-Chir. Trans.* 1882.

Toes may be hypertrophied, webbed, bifid, or supernumerary.

HAMMER-TOE.—A condition in which the last phalanx is bent perpendicularly downwards. If necessary, divide subcutaneously, opposite second phalanx, the corresponding digital offset of plantar fascia, or both fascia and tendon. Doubtful whether it be a nervous contracture or due to the pressure of tight boots. Sometimes a congenital peculiarity scarcely more pathological than a retroussé nose, and equally harmless.

Tongue, Diseases of.—With a view to facilitating diagnosis

(a rather difficult task to the student of tongue-diseases), I shall adhere to the following analytical classification which starts from the most palpable feature of each disease. I. Superficial ulcerations—simple; syphilitic, primary and secondary. II. Deep ulcerations—1, simple, 2, syphilitic, 3, malignant. III. Localised swellings—abscess, innocent tumour (very rare) nævus, gummatæ, malignant. IV. General swelling—acute inflammation, congenital enlargement, general enlargement secondary to other diseases of tongue or of digestive tract. V. Non-ulcerative superficial affections—psoriasis, ichthyosis, papilloma.

TONGUE, SIMPLE SUPERFICIAL ULCERATION OF.—*Cause.*—Indigestion: irritation of sharp-edged teeth. Occasionally aphthous inflammation. *Diagnosis.*—No induration, or at least no marked degree of it. Ulcers sometimes multiple. Tongue frequently red and glazed. Corresponding sharp edge of tooth may be detected. Signs of indigestion. Pain, frequently. Absence of syphilitic history and of collateral symptoms. *Treatment.*—File sharp teeth. Touch ulcer with silver nitrate. Purgatives. Soda bicarb. with infus. calumbæ before meals. The more superficial the ulceration, the more likely is chlorate of potash to be highly useful.

TONGUE, SUPERFICIAL SYPHILITIC ULCERATION OF (Secondary or Tertiary).—*Diagnosis.*—Similar ulceration on sides of mouth or fauces. Perhaps psoriasis also present. No such marked induration as is common in cancer. History and patient's aspect may be syphilitic. *Treatment.*—Antisyphilitic. Locally—chlorate of potash gargle, gargarisma nigrum, hydrarg. c. cretæ, inhalation of calomel fumes (5 grains nightly). Internally either pot. iod., or hydrarg. perchlor., or tinct. iodi mij., ex aquâ, ter die. For obstinate syphilitic ulcer of tongue, Berkeley Hill recommends a pill of iodoform, gr. $\frac{1}{2}$, ext. gentian, gr. $1\frac{1}{2}$, three times a day.

PRIMARY ULCER (CHANCRE) OF TONGUE is not unknown.

TONGUE, DEEP SYPHILITIC ULCERATION OF (Tertiary).—*Causes.*—Gummatus abscess, or (rarely) spread of superficial ulcer. *Appearance.*—A deep ulcer or fissure, with abrupt edges, usually towards the centre of the tongue, sometimes at

the edge, and often with a history of previous tumour or swelling (gumma). Speaking of gummata of the tongue, Morrant Baker says: 'They are usually, but by no means always, multiple; they rarely or never lead to fixation of the tongue, or to salivation, or to very much pain: and they are very tolerant of pressure.' In these respects they contrast with cancer. *Treatment*.—Antisyphilitic, especially pot. iod. (gr. x. ter die). Certain articles of diet—e.g. cheese, beer, and marmalade—should be avoided.

TONGUE, MALIGNANT ULCERATION OF (Epithelioma).—*Causes* as obscure as those of cancer elsewhere. Chronic irritation of sharp teeth doubtless an occasional factor. Clay pipes. Most frequent in males and in late middle age. Commences as a fissure (rarely as a wart). Syphilitic disease said to often pass into epithelioma. *Diagnosis*.—Distinguish from syphilitic ulceration by (1) hardness of base and edges; (2) absence of collateral signs of syphilis; (3) position—cancer usually begins at side of tongue, deep syphilitic ulcer generally lies near septum; (4) pain is greater in cancer; (5) glands are affected earlier and more extensively, and eventually form a huge, hard mass, in cancer; (6) fixation of tongue from cancerous infiltration; (7) salivation. Unfortunately, in the very cases in which diagnosis is most difficult and most important, the above signs may not be well marked. Hence the surgeon sometimes has to try anti-syphilitic remedies merely because he does not know whether he has to deal with cancer or syphilis. Tenderness—intolerance of *firm* pressure distinguishes a cancer, and the characteristic hardness is of the same nature as that of *scirrhus mammae*, i.e. not like inflammatory induration. *Prognosis*.—Without operation, hopeless. With operation, varies from some hope of non-recurrence when a small cancer and a wide margin of apparently healthy tissue is excised, to the certainty of recurrence when the conditions are reversed. 'The mortality after operations on the tongue is very slight, and does not amount to 3 per cent.' (Henry Morris, *Lancet*, May 20, 1882.) *Treatment*.—If diagnosis be doubtful, try large doses of pot. iod. (gr. x.-xx. ter die). But beware of wasting precious time in so doing. Pot. iod. sometimes *seems* to do good to genuine cancer. Alas

for the patient when the surgeon is thus beguiled into delay ! Draw bad teeth. Forbid smoking. Regulate diet. Question of removal depends upon extent of disease. If removal of whole tongue will not suffice to take away all the disease, treatment is usually palliative. Removal. Perhaps justifiable to excise tongue even if all disease cannot be got away, because the pain of cancer depends so much on the movements of the tongue. (See Whitehead, *Brit. Journ.*, July 21, 1882.) Operation may be by (1) knife, (2) écraseur, (3) galvanic cautery, (4) ligature, (5) Richardson's scissors. Prefer knife for comparatively limited operations : écraseur most popular in extensive ones. Remove disease of anterior part of tongue, and in suitable cases even more extensive disease by operating entirely through mouth. In some instances the whole tongue could be thus removed, if Sir James Paget's advice be followed—to pass scissors into the mouth and divide the muscles which attach the tongue to the jaw, before pulling forward the tongue. In such an operation the galvanic écraseur, very deliberately used, would be safest, for severe haemorrhage would here be embarrassing. But see Whitehead's operation (below). Various plans have been devised for giving the operator more room to work in, especially (1) Nunneley's, who passes the écraseur chain through a wound in the mylo-hyoid space, and prevents it from slipping forwards by means of hare-lip pins piercing the base of the tongue well behind the disease. (2) Sédillot's, who divides the symphysis of the jaw (in a $>$ -shaped manner, to facilitate correct apposition after the operation). Of course the lower lip is divided. An interdental splint might be useful in after-treatment of divided jaw. (See Lyons, *St. Barth.'s Hosp. Reports*, 1878.) (3) Submental operation (Regnoli's). Broad-arrow-shaped incision in mylo-hyoid space, through which tongue is dragged previous to removal. Protect facial arteries, and secure linguals as soon as divided. (4) T. Smith's—incision of cheek from corner of mouth outwards (or obliquely downwards,—Gant). (5) Whitehead, of Manchester, cuts through base of tongue from before backwards slowly with scissors, looking out for the lingual arteries (*Lancet*, 1880, and April 14, 1883). Billroth first ties the linguals through incisions below the jaw, and afterwards

cuts out tongue with scissors. Dressing of iodoform gauze inside mouth. Through the submaxillary incisions diseased glands can be removed, an obvious advantage.¹ Kocher tracheotomises as well as ties the linguals. If the young surgeon is bewildered by multiplicity of methods, I recommend him strongly to attend only to the following principles :—1. Use nothing but blunt scissors for cutting (except a scalpel for skin). 2. Cut slowly. 3. Examine as carefully as possible for enlarged glands before commencing. 4. If any are found, tie the linguals and remove all the glands you can find through the incisions then made. 5. If no glands are found enlarged, dispense with tying the linguals, in fact, do Whitehead's operation. 6. Tie the linguals on the dead subject first. 7. Do be careful to cut wide of the disease. 8. Thoroughly aseptise hands, instruments, sponges, &c. 9. Dress with iodoform gauze. In all operations on the tongue, a stout whipcord ligature through middle of anterior third, metal retractors, and a simple gag are required. Also prepare for haemorrhage. Use Clover's or Mills's method of anaesthesia through a tube. (*Lancet*, vol. i. 1879.) *Prognosis*.—Quite good for small operations. Grave for larger ones. Speech returns, perfectly in former : distinct, but sadly modified, in latter. *After-treatment*.—Feed through oesophageal tube and by enemas for a few days. Use simple gargles to cleanse mouth. For distressing salivation—alum and pyrethrum gargles.

TONGUE, ABSCESS.—Very uncommon. *Causes*.—Obstruction of mucous glands ? Syphilitic gummata ? Foreign body. Make an exploratory puncture to clear up diagnosis.

TONGUE, INNOCENT TUMOURS OF.—Very rare. *Cysts beneath the tongue* are common. *Vide RANULA*.

TONGUE, NÆVUS OF.—Rare. *Treatment*.—Like that of nævus elsewhere. But if it cause no unpleasant effects, and do not grow, let it alone.

TONGUE, GUMMATA OF.—Seldom seen before stage of ulceration. *Vide DEEP SYPHILITIC ULCER OF TONGUE* (above).

TONGUE, MALIGNANT TUMOUR OF. *Vide MALIGNANT ULCERATION OF TONGUE* (above).

¹ See F. I. Shepherd, *Annals of Surgery*, vol. ii. 1885, p. 368.

TONGUE, ACUTE INFLAMMATION OF (Acute Glossitis).—Rare. *Causes*.—Mercurial salivation, iodism, injury (e.g. from stings of insects), unknown influences. *Symptoms*.—Swelling, often enormous. Pain. Salivation. Danger of suffocation. *Treatment*.—Treat cause. Astringent gargles. Deep, longitudinal, dorsal incisions in severe cases. As lower surface of tongue is more extensile than upper, the former tends to present upwards. Bear this in mind while incising (Wormald and Holmes Coote). Support strength.

TONGUE, CONGENITAL ENLARGEMENT OF (Macroglossia).—Very rare. *Treatment*.—Remove V-shaped piece from anterior part of tongue, and bring flaps together. Remember that children bear haemorrhage badly. Slight enlargement of tongue is a common sign of constitutional disorder. Treat the cause.

TONGUE, PSORIASIS OF.—Sometimes, but not always, syphilitic. Whitish and dry-looking patches on the tongue, with shallow fissures. Under the microscope, the epithelial layer is found slightly thickened, but the papillæ smaller than normal. The condition should be compared and contrasted with that in 'chronic superficial glossitis' (Fairlie Clarke), in which, according to Butlin, the papillæ are absent, the surface almost as smooth to the microscope as to the naked eye, the epidermis thinned, but the sub-epithelial tissue thickened and infiltrated with cells (*Med.-Chir. Trans.*, vol. lxi.).

Tonsil, Chronic Enlargement of.—Common in scrofulous children, especially in cold, damp climates. *Pathology*.—An hypertrophy of both glandular and fibro-cellular constituents of tonsil, the result of chronic inflammation. *Signs*.—Visible enlargement of tonsil. Peculiar throaty voice. Occasionally, difficulty of breathing. Mouth usually kept open; characteristic expression of face. Deafness. Extra liability to acute and subacute tonsillitis. *Prognosis*.—Considerable enlargement, if coming on before puberty, will often greatly diminish as adult life is approached. But it seldom disappears spontaneously and entirely. *Treatment*.—For severe cases of long standing—excision. Other cases should be treated as pharyngitis, *quod vide*. *Excision of Tonsil* may be effected with a bistoury and vulsell-

lum-forceps. In using the tonsil-guillotine with a spear take care to apply it with the spear or hooks towards the median line and the ring next the tonsil. The spade-guillotine is preferable. Pass the guillotine into the pharynx horizontally, and rotate it into the perpendicular plane as you place it over the tonsil. Often the tonsil can be pushed into the guillotine by the forefinger of the left hand placed outside the neck.

Tonsil, Malignant Disease of, occurs usually in middle life, is generally epithelioma. Distinguished from syphilis. So long as the tonsil is movable, operate, even if glands be enlarged ; but the latter must then be removed also. It may be necessary to slit up cheek or to open pharynx from beneath jaw, or to insert Trendelenburg's trachea-tampon. (Good series of articles on this subject in *Rev. de Chirurg.* for 1886.)

Tonsillitis, Acute (Quinsy).—*Causes.*—Predisposing are chronic enlargement and depressing influences, *e.g.* dark, damp residences, defective drainage. Usual exciting cause, catching cold. *Signs.*—Pain on swallowing, at first slight, but gradually increasing in some cases till the act of deglutition inflicts a pain like the stab of a knife. Swelling both internally and externally. The swelling may become so diffuse that the jaws may be scarcely separable. When suppuration takes place, pain usually strikes into ear and becomes throbbing. Fluctuation develops. Foul tongue (due to oral catarrh) ; offensive breath; fever—temperature may rise to 104°; and slight delirium for one or two nights not infrequent. *Diagnosis.*—Seldom presents difficulty, except when the mouth will not open. Then, upon looking carefully at the patient, it will be seen that the swelling, however diffuse, has its centre below and beneath the angle of the jaw, is not chiefly in front of and below the ear, as in mumps, or over the jaw, as in diffuse inflammation commencing near the gums and teeth. Moreover, the voice is generally characteristically guttural, and the history clear of an acute course commencing in the throat. It is to be remembered that inflammation of the tonsils may be only part of a more serious disease, *e.g.* scarlatina or diphtheria. *Prognosis.*—Tonsillitis usually attacks those accustomed to it, and who generally know

how, by a little care, to check it. But it frequently goes on to suppuration ; and in exceptional cases, when very diffuse, causes death by exhaustion or by suffocation. *Treatment.*—Prophylactic is the same as that for catarrhs in general. In addition, do not wear low shirts and collars, especially as regards the night-dress. Wear a light wrapper round the throat when out at night ; avoid hot, smothering comforters. Early retirement to bed, with a narrow piece of flannel round neck, will often cut short a sore-throat. Best gargles are those of capsicum, of guaiacum, and of chlorate of potash. Give mist. guaiaci, or pot. chlor. *ad libitum* internally. Soda salicyl. gr. x. every 2 hours. Prof. Giné states that both acute and chronic tonsillitis find a powerful remedy in pulv. soda bicarb. applied locally. McKeown, of Belfast, strongly recommends pilocarpine. I have used subcutaneous injection of a solution of this drug myself with excellent and rapid results, but also with somewhat alarming symptoms of faintness on one occasion. When swelling is very great, especially if fluctuation can be felt, puncture tonsil. Use a bistoury wrapped in lint, except towards the point, and direct its edge and point somewhat inwards (*i.e.* towards median plane of body and away from great vessels). If mouth cannot be opened, patient must simply rest in bed, with a high pillow, in a rather warm, thoroughly dry room, using derivatives, such as mustard and hot water, to feet, inhaling the steam of hot water with a little creasote dropped in it. Hot fomentations may be applied externally, or leeches beneath the angle of the jaw. Do not forget that leech-bites leave scars.

Toothache. *See Appendix.*

Torticollis. *See NECK (WRY-).*

Trachea, Foreign Bodies in. *See LARYNX, FOREIGN BODIES IN.*

Tracheotomy, Indications for.—1. Foreign bodies in trachea or bronchi or pharynx. 2. Scalds of glottis in children. 3. Very advanced and extensive disease of larynx. 4. Croup. 5. Diphtheria in children. 6. As a preliminary step in extensive operations on and about the jaws and throat (as tracheotomy forms a serious complication of such cases, often making

asepticism impracticable, dispense with it if possible). In such cases the anæsthetic is usually administered through a tube in the tracheal opening. At the same time, the glottis may be shut off from the lungs by using Trendelenburg's 'trachea-tampon,' thus preventing any blood from passing down the trachea. *Opération.*—Two chief varieties, viz. (1) high and (2) low, respectively above and below isthmus of thyroid. Latter not usually either necessary or desirable. *Instruments.*

—Scalpel, dissecting-forceps, artery-forceps, bulldog-forceps, metal retractors, blunt hook, sharp tracheotomy-hook, cannulae (Fuller's bivalve preferable at first; Baker's rubber tubes may be substituted after a few days). Durham's 'lobster-tail' cannula less irritating than ordinary metal tube. R. W. Parker recommends an angular tube and Rogers's movable collar. H. A. Martin, of Boston, U.S., does not use tubes at all. (See *Dublin Med. Journ.*, Sept. 1878.) Tape to tie cannula in place. Sponges, ligatures, gauze, feather, kettle, curtains, &c., the latter for after-treatment. Patient lies on his back; surgeon stands on right side. Pillow beneath neck, head back. Get best light possible. Determine exact median line by seeing and feeling. Feel lower border of cricoid cartilage. Incise skin from this point downwards two inches. Avoiding anterior jugulars, cut in middle line carefully down to trachea. When thyroid isthmus is recognised it may, if necessary, be hooked down or even divided. When trachea is reached, it can easily be distinctly felt. Now insert sharp hook into trachea, always keeping to median line. Slightly raise trachea with this hook. It thus becomes defined, and can be incised with confidence. Tracheal opening to be perpendicular, and of size proportional to the patient's and to that of the cannula to be used. Always keep to the median line, and take care that the parts are not displaced laterally by the retractors. In opening trachea, turn edge of knife upwards. *After-treatment.*—Usual practice is to surround bed with curtains, to conduct steam of a kettle by a tube to within the curtains, and to keep the room at a temperature of about 70° Fahr. But some surgeons (e.g. Lawson) are less particular about these points, preferring abundance of fresh air. Over the tracheal wound place a sponge or a fold of gauze.

From time to time, when the patient coughs, assist with a feather to clear away mucus or false membrane. Twice a day, or oftener if necessary, remove inner tube and clean it. Surgeon may occasionally remove and clean outer tube with advantage. This must frequently be done if inner tube is not used. Support strength with abundant liquid food, milk, beef-tea, &c. Of course, when cannula has to be kept in any time, it does not prevent return to solid food. Insensitiveness of glottis generally supervenes, and allows part of food to trickle into larynx. D. A. Gresswell recommends a plan of training the glottis to resume its functions whilst the tracheotomy aperture is being allowed to close gradually. *Complications.*—(1) Haemorrhage, (2) bronchitis and pneumonia, (3) erysipelas. Mediastinal emphysema and even pneumothorax. (See CHAMPNEYS, *Med.-Chir. Proc.* 1882.) To prevent this, do not divide the deep cervical fascia downwards towards the neck farther than is necessary; when it is once divided, do not delay opening the trachea. 'If artificial respiration should prove necessary, the tissues should be kept in apposition with the trachea, and any manipulation performed steadily and without jerks.'

Transfusion.—Various apparatus. Roussel's and Aveling's probably the best. Material—human blood the best; but warm saline solution is also valuable in cases of haemorrhage.¹ Landerer recommends the addition of 3 per cent. of cane sugar to the saline solution. The improvement produced by mere saline solutions may be too transitory. There is great difference of opinion as to the indications for using defibrinated blood, pure or diluted with saline solution. Dr. John Duncan catches the blood shed in amputation in a solution of phosphate of soda and transfuses the mixture, if the patient's state requires it. **Operation.**—Asepticise arm or arms, every apparatus, utensil, and hand to be used, first with carbolic lotion (1-20), then with warm water which has been lately boiled and now cooled sufficiently. If a saline solution is to be used, make it with boiling water + cold distilled water; resulting temperature to be a little above 100°. Supposing Aveling's syringe to be used, fill

¹ I have seen the pulse-rate drop twenty per minute after the transfusion of 4 oz. of a solution of common salt ('4 gr. to 1 oz.'), temp. 100°.

it with saline solution. Expose the vein or veins and pass two catgut ligatures beneath each vein. Open the vein of the recipient obliquely, insert one nozzle upwards, and tie the vein below the opening, if it should bleed. If a saline solution is to be injected, place the other nozzle in it, and, working the instrument deliberately and slowly, pass the fluid through from the utensil to the vein. If blood is to be injected, open the vein of the donor and pass in the nozzle downwards; tie the vein above the opening. At the completion of the transfusion, tie the vein or veins on that side of the opening towards which the nozzles have been pushed in. Nothing can be easier than the operation above described, if only the surgeon and assistants will scrupulously avoid hurry. The custom of whipping fibrine out of the blood is now seldom followed.

About 4 to 8 oz. of fluid is the proper quantity.

Trephining.—Indications for the operation are given under HEAD, INJURIES OF (especially sub-article 'Compression.' See also 'Arteries; Ligature of,' (middle meningeal), and 'Brain, Abscess of,' and 'Tumours of.' The operation is occasionally done for cases of epilepsy, and even of insanity, in which the surgeon thinks he recognises signs of localised mischief. And the labours of Ferrier, Fritz, Hitzig, Duret, and others, together with the development of antiseptic surgery, have led to further co-operation between the physician and the surgeon in the treatment of cerebral diseases. See the debate on Bennett and Godlee's case at the Royal Med. and Chir. Soc., May 12, 1885. *Operation.*—Scalpel, dissecting-forceps, artery-forceps, trephine-elevator, piece of quill, sponges, antiseptic dressings, spray, &c. Unless bone is already exposed by a scalp wound, reflect soft tissues sufficiently by Y-shaped incision. Adjust trephine so that the pin shall project very slightly beyond the teeth. If there be a fracture, place the pin on a firm edge of bone. In working trephine, take care to press evenly on all sides, lest dura mater be reached on one side before other side of trephine is half through. As soon as a groove is made withdraw the pin. As dura mater is approached saw very gently, and frequently probe with the piece of quill. As soon as this detects dura mater on one side, tilt trephine towards

other side. When loose enough, remove disc of bone with elevator. Dangers: (1) of wounding dura mater: to be avoided by precautions mentioned above; (2) of wounding a sinus or large arterial branch: to be avoided partly by same precautions, but chiefly by bearing in mind anatomical landmarks.¹ The bones of the limbs are also frequently trephined for osteomyelitis, central abscess, &c. In such cases it is not necessary to use the quill or proceed so very cautiously as in working on the skull.

Trochanter, Injuries of. *Vide FRACTURES OF FEMUR.*—Prolonged weakness, and sometimes permanent atrophy, occasionally produced by falls upon the great trochanter, even without fracture.

Tubercle.—Two kinds: (1) miliary, (2) yellow or cheesy. The latter is due to fatty degeneration of the products of strumous, i.e. tuberculous inflammations or deposits.

Causes.—(1) Immediate, the tubercle bacillus. (2) Indirect, i.e. the conditions under which the bacillus gets into the body. This second set of causes can only be conjectured. Through the food (?), e.g., by drinking the milk of tuberculous cows. Through the breath or by coitus (?), e.g., communication of phthisis from husband to wife. There is more positive evidence of the latter than of the former. Tubercle can be inoculated; that is proved beyond a doubt; but such can scarcely be the usual mode of accidental transmission. (3) Is tubercle hereditary? Is the disposition to be infected with it hereditary? It seems almost unpardonable to hint the slightest doubt upon the second of these questions. But really both require a closer investigation than they have ever received.

Certain localities, especially low-lying damp places, ill-ventilated, crowded rooms, bad food, and various anti-hygienic conditions, are favourable to the development of tubercle.

¹ There are excellent articles on the indications for trephining, &c. in *St. Barth's Hosp. Rep.* vol. xviii. (Walsham); *Trans. of American Med. Assoc.* 1884 (Briggs); *Annals of Surgery*, 1885, No. 3 (Amidon); and *Annals of Surgery*, 1885, Nos. 7, 8, and 9 (John B. Roberts). The last is the most complete study of the subject known to me. Briggs has had a large personal experience, but the other papers are based, to a great extent, on cases collected from the journals; and neither Amidon nor Roberts appreciate fully the deceptive nature of such material. I see, by Amidon's tables that at least one surgeon has published his successes and kept silence about his fatalities.

Pathology.—Tuberculosis characterised by the formation of minute nodules or tubercles. ‘The typical structure of each fully-formed primary nodule consists in (a) a collection of lymphoid round cells, enclosed in a delicate fibrillar meshwork or stroma ; (b) an internal zone, more or less evident, of larger nucleated epithelioid cells ; and (c) a central multinucleated or giant cell.’¹ Any region of the body may be affected, but the tissue selected is usually the lymphatic.

Caseation follows, commencing at the centre. Neighbouring ‘tubercles’ coalesce, and thus large cheesy masses ultimately result, such as those frequently removed from strumous glands.

Each centre of disease tends to enlarge and invade neighbouring parts ; thus, for example, the whole epiphysis of a bone, the neighbouring synovial membrane, and the epiphysis of the opposite bone become affected. Moreover, there is constant danger of distant infection through the blood or lymph vessels, *e.g.* tubercular meningitis may come on in the course of a case of joint-disease. This infection may be general. It is then, as a rule, rapidly fatal, and termed *acute tuberculosis*. General infection via the lymphatics can only take place when the last intercepting gland is passed, a long, and, for the tubercle bacillus, by no means easy journey, as clinical facts often remind us. The presence of tubercle generally sets up inflammation in the part affected.

Tubercle, like most, if not all, other infectious diseases, has an unquestionable tendency to ultimate recovery. And this result occasionally happens under all kinds of external conditions, perhaps in spite of them. But too often the organs affected are so vital that the owner cannot survive their destruction, which is a usual event as regards the particular locality infested. Or his powers fail to last out the long *time* required for spontaneous cure of tubercle of organs not vital. Whatever treatment the patient is undergoing at the time is said to have cured him. If he has been in bed, rest gets the credit; if he has been getting about, exercise may be said to have done it ; in the same way comes the turn of plaster of Paris,

¹ Sidney Coupland, *B. M. J.*, Feb. 1882. An excellent collection of aphorisms respecting tubercle. See also Pepper’s *Surgical Pathology*, p. 169.

of iron apparatus, of setons, of drainage-tubes, pure dry air, &c. What would the tubercle bacillus say to all these, its boastful enemies, if it could think and speak ? Well, probably it would confess that they (especially local rest) did vex its existence considerably, hasten the slow approach of its natural termination, and obstruct its efforts to emigrate to parts of the body still free from its ravages.

The *bacillus*. See MICRO-ORGANISMS.¹

It is a small, rod-shaped bacterium, present in very varying numbers in the parts affected. Staining fluid used for it—Ehrlich's, as modified by Weigert. The formula is : of a saturated watery solution of anilin, 100 parts ; of a saturated alcoholic solution of methyl-violet (fuchsin), 11 parts. Mix and filter. Rapid staining is obtained by warming. The specimens are then decolorised by immersion in dilute nitric acid (1 to 2), and stained with a contrast dye. The bacilli stain red.

Treatment.—Hygienic requires the various conditions usually considered 'strengthening,' fresh air, good food, dry lodging, daylight, cheerful occupation, flannel clothing, moderate exercise. Cleanliness of head and skin. Strict attention to each trivial ailment. Medical treatment is (1) antidyseptic, and (2) tonic and nutritive. Tongue, stomach, and bowels must be attended to on general principles. Gregory's powder and hydr. c. cret. often useful, especially in children. Soda bicarb. (gr. x.—xv.) ter die in inf. calumbæ just before meals. Cod-liver oil is the remedy. Give it after meals, increasing the dose gradually up to 3j. ter die. Occasionally suspend its administration if it disagree with stomach. Small doses of nitric acid and strychnine useful adjuncts. (Williams, quoted by Savory.) Iron, ammonio-tartrate, citrate, fresh carbonate, vinum ferri (iodide of iron for fat flabby children). Iodides sometimes mischievous if fever be present. Mineral acids. Quinine, tinct. cinchonæ co. Pancreatic emulsion. Change to a new climate, which, whether warm or temperate, should certainly be dry : English watering-places, Margate, &c. Madeira,

¹ See also Watson Cheyne, *Practitioner*, April, 1888 ; and G. A. Heron, *B. M. J.*, April 28, 1888.

sea voyage. Local treatment is given under special heads. In old age, 'iron, cod-liver oil, sea air, &c., of little potency. Rest, warmth, and good food more important.' (Paget.)

Tumours.—*Definition.*—Word 'tumour' not always used in same sense. (1) Surgeons sometimes use it loosely, as if synonymous with 'swelling of undetermined nature,' as, *e.g.* in such a speech as this, 'Examine this tumour and tell me whether you think it is an aneurism, or a new-growth.' (2) The usual meaning of 'tumour' is an abnormal swelling in the tissues, which cannot clearly be regarded as mere inflammatory new-formation, or as aneurismal dilatation of a single vessel. The margins of this definition are necessarily uncertain, because the limits of the process of inflammation are not quite known.

Causes.—There can be no question but that tumours do frequently arise from continued local irritation. Cases have occasionally been published in which cancer has appeared to have arisen suddenly at the seat of an acute injury, *e.g.* a fracture. To this phenomenon, the term 'acute traumatic malignancy' has been applied. To what extent hereditary predisposition acts as a predisponent is not yet settled. The very common idea that cancerous tumours are almost as hereditary as Roman noses is certainly wrong. That heredity plays no part in their production is equally incredible. It plays an unquestionable part even in the production of wooden legs, because the martial spirit which has exposed his inferior members to shot and shell is often 'bequeathed from bleeding sire to son.' It would appear from the clinical observations of Sir James Paget, confirmed by the microscopic ones of Mr. Butlin, that the processes of inflammatory new-formation, of ordinary cellular infiltration, may pass, by a gradual commingling, into the process of cancerous infiltration with new cells genetically sprung from epithelium. Often also cancer is seen to attack localities which have long been the seat of syphilitic, of eczematous, or of some other chronic fissure or ulceration. Such new-growths as elephantiasis and bronchocele proceed from endemic, perhaps miasmatic, influences. It is not impossible that malignant tumours are contagious, though there are no sufficient clinical proofs of it. Considering how slow most cancers are to infect the sufferer's

own system (since early removal sometimes effects a perfect cure), the absence of such proofs is not surprising. Certain localities and certain ages are specially subject to certain tumours ; e.g. lower lip of middle-aged, to epithelioma. Sex generally acts in a manner easily explained. For example, it is not difficult to see why men alone should have epithelioma scroti, women alone fibroid of the uterus, and women almost the monopoly of tumours of the breast. *Classification.*—Fatty tumour ; fibrous tumour ; cartilaginous tumour ; osseous tumour ; myoma ; neuroma ; vascular tumours ; sarcoma ; lymphoma, including glioma ; recurrent fibroid ; fibro-cellular tumour ; myxoma, &c. ; papilloma ; adenoma ; cystic tumours ; carcinoma.¹ The carcinomata, with most sarcomata and certain lymphomata, are often classed together as *malignant*, the rest being termed *innocent*. Malignancy means simply endowed with a tendency to infect the system. In diagnosing a tumour, the most important question to answer is that of innocent or malignant. In some cases this is the only practical question.

FATTY TUMOURS, LIPOMATA.—Two varieties, viz., 1, circumscribed ; 2, continuous. The common fatty tumour belongs to the former variety. Best example of continuous lipoma is excessive double chin. *Cause.*—Usually unknown. Sometimes follows local irritation. Rarely appears in children or very old people. Continuous lipoma generally begins about age of forty. It is sometimes multiple and symmetrical. Female sex most liable. *Anatomy.*—Common fatty tissue surrounded by a fibrous capsule and divided into lobes by fibrous partitions. Sometimes outlying lobes project into the adjacent parts. Fibres connect the capsule with the skin and cause the latter to dimple. *Signs.*—Lipomata are soft, elastic, 'pillowy,' movable, but causing the skin to dimple as they move. Normally without pain or tenderness, except a little aching from mere weight, and, in a few cases, a little pain, apparently neuralgic. Almost always single. Occasionally multiple. Bulk, unlimited, even up to 50 lbs. *avordupois.* Multiple fatty tumours when circumscribed rarely grow to more than 1 inch in diameter. Growth slow.

¹ Paget adds: Neuralgic, Pulsating, Floating, and Phantom.

Their loose connections often permit fatty tumours to shift their positions under the influence of gravity. They are liable to cystic, cretaceous, and ulcerative degenerations. *Seat.*—Chiefly trunk and adjacent parts of limbs. *Diagnosis.*—When there is no cutaneous dimpling and they are unusually firm, they may be mistaken for cysts, or for fibrous or sarcomatous tumours ; but the mistake is of no consequence. *Treatment.*—Let the continuous lipoma alone, unless restricted diet and judicious exercise will benefit it. Or give liq. potass. mqx. ter die for a long time. Other single fatty tumours should be excised. Cut straight down upon the tumour, or into it if you like, and then dissect or tear it away from its connections. In dressing the wound attend to drainage and proper adjustment of pressure and support. Multiple fatty tumours should be let alone, as a rule. Lipomata are occasionally pendulous : these should simply be cut off.

FIBROUS TUMOURS. FIBROMATA.—*Anatomy.*—Fibrous tissue variously arranged, sometimes in interlacing bundles, sometimes in concentric circles. Arrangement of fibres may or may not be visible to the naked eye. Section whitish or pale red in colour. Consistence generally firm and elastic, sometimes quite soft. Mucous softening, serous infiltration, calcification, even true ossification not rare. Large cysts may form. Sarcomatous tissue (round or spindle cells) frequently mixed with the fibres,—‘fibro-sarcomata.’ Vascularity usually low. *Seats.*—Usually uterus, bones, nerves, cellular tissue near joints, sheaths of tendons, testicles, and ear-lobules. *Characters.*—Rounded or modelled to surrounding parts, smooth, non-lobed, firm, resistant, elastic, generally hard, occasionally soft. Of course degeneration alters their physical properties. Growth slow. Size unlimited. Pain absent. Commence in middle life. Those connected with nerves or bones sometimes commence in the young (after puberty). Number :—periosteal fibromata usually solitary ; but uterine and neuromatous fibroids, especially the latter, are more often multiple. *Diagnosis.*—‘Consistence, locality, age, mode of attachment, and form of the tumour almost always lead to its correct recognition.’ *Treatment.*—Remove thoroughly. Uterine fibroids

require special consideration, and are neither to be rashly interfered with nor supinely left alone. In consequence of the dangerous haemorrhage they sometimes cause, the ovaries are sometimes excised. (Battey's operation. See OÖPHORECTOMY in Appendix.) *Recurrence.*—Pure fibroma probably only recurs when excision has been incomplete. But fibro-sarcoma may infect the system.

CARTILAGINOUS TUMOUR. ENCHONDROMA.—*Anatomy.*—Resembles sometimes hyaline and sometimes fibro-cartilage. But pathological differs from normal cartilage in three respects, viz.—(1) it is traversed by 'capsular-like,' communicating, connective-tissue meshes; (2) these meshes are usually vascular, while normal cartilage has no vessels; (3) the inter-cellular substance may be gelatinous or friable. The section cuts gristly and is bluish or yellowish-white, or the tumour may be softened or degenerated. *Locality.*—Chiefly the bones: metacarpals and phalanges of hand; femur, pelvis, &c.; parotids, testicles, ovaries, breasts, other glands. Frequently mixed with other tumours. *Age.*—Youth. 'The younger the age at which a tumour of bone begins, the more is it likely to be cartilaginous, if its general characters agree therewith.' (Paget). *Characters.*—Hard, nodular, incompressible, or perhaps very slightly compressible, with a very quick, elastic recoil. Rarely soft, but even then very elastic. Rate of growth not characteristic. Size variable. Coincident ossification often occurs and alters character of tumour. *Diagnosis.*—Consider carefully locality, age, and rate of growth. *Prognosis.*—Purely cartilaginous tumours are as innocent and non-recurrent as any class of tumours. *Treatment.*—See ENCHONDROMA OF BONES, OF PAROTID GLAND, and OF TESTICLE. Gamgee has published a remarkable case of Enchondroma, for which he had to disarticulate at the hip-joint.¹

OSSEOUS TUMOURS. OSTEOMATA. See EXOSTOSES.

MYOMA.—A tumour consisting of muscle cells or fibres. Pure myomata are unknown; but muscular elements, both striped and unstriped, occasionally are found in fibromata.

NEUROMA.—The surgeon often applies this term to any

¹ London, Churchill and Sons, 1865.

tumour situated on a nerve ; the strict pathologist confines it to a tumour consisting mainly of nerve filaments or substance. The latter, so-called 'true neuromata,' are very rare, most tumours growing on nerves being *fibromata*, or fibro-sarcoma. Usually multiple, often recurrent. Excision without injury to nerve itself rarely possible. As a rule best let alone. A *traumatic neuroma* is the bulbous end of a divided nerve. When painful, excise.

VASCULAR TUMOURS. ANGEIOMATA. NÆVI. ERECTILE TUMOURS.—*Definition.*—Tumours composed almost exclusively of vessels held together by a slight amount of connective tissue. *Varieties.*—Three : (1) capillary, including common nævi and 'port-wine stains ;' (2) venous, or cavernous angeiomata ; (3) arterial, or pulsating, erectile tumours ; with which may be placed 'aneurism by anastomosis.' *Etiology.*—Many are congenital (especially the first kind). The others usually commence in early childhood, excepting aneurism by anastomosis, which often develops in young people, after injuries. *Anatomy.*—(1) Capillary angeioma consists of a mass of dilated capillaries, arranged in lobuli, each of which corresponds to the blood-supply of a single hair or cutaneous gland. The whole mass is of any size from a pin's head to a sixpence or a penny, or a much larger space, and of varying, though usually trifling thickness. Colour from deep red to slatey-blue. But sometimes the skin itself is not involved, and it then may be of normal colour. Redness disappears under pressure, so also does part of thickness of tumour when there is any perceptible thickness. Capsule, more or less defined. (2) Cavernous angeioma consists of an assemblage of spaces filled with blood and resembling dilated veins, or, more accurately, the corpus cavernosum penis. In some of the spaces, chalky 'vein-stones' may be found. (3) Aneurism by anastomosis, or cirsoid aneurism, is a convolution of dilated and elongated arteries. *Signs.*—Port-wine stains and ordinary nævi are easily recognised by their colour, and their congenital or early origin. All purely vascular tumours are more or less soft and compressible. The venous ones dilate during forced expiration. The arterial pulsate. *Seats.*—Mostly subcutaneous tissue of

scalp, face, and trunk. Venous tumours not unfrequently occur more deeply, especially in orbit, tongue, intermuscular spaces, and even in the liver. *Degeneration*, especially cystic, may occur. *Number* of nævi in an infant often multiple. *Diagnosis*.—Rarely presents any difficulty except in the deeper venous and capillary tumours. These may be confounded with lipomata or cysts; but the possibility of partially or wholly emptying them, and the effect on them of forcible expiration, will often settle the question. *Prognosis*.—If left alone, they will occasionally progress till they cause deformity, weakness, and the absorption even of important parts. But they frequently remain stationary, or may even retrograde. *Treatment*.—1. By injection of tinct. ferri perchlor.; dangerous, especially in nævi of head and neck. 2. By galvano-cautery, benzoline cautery, bulbous nævus-cautery, small sticks of lunar caustic driven into tumour. Edmund Owen recommends the benzoline cautery for the treatment of large as well as of small nævi (*B. M. J.*, Aug. 20, 1883). 3. By nitric acid (best for small and superficial nævi). 4. By ligature: various modes, subcutaneous and otherwise. 5. By compression. 6. By excision. Before excision, the base of the nævus may be surrounded by an elastic ligature, which should be tightened after pressing the blood out.¹ Thus the operation is rendered bloodless. Nævi being encapsulated, may be excised exactly like any solid tumour. Balmanno Squire treats port-wine stain by systematic scratchings and cross-scratchings with a hot cautery-needle. Excision is probably the best treatment for aneurism by anastomosis.

SARCOMATA.—This most interesting group of tumours, whose association and nomenclature are mainly due to Virchow, includes the *fibro-cellular*, the *mucous tumour*, and the *myeloid tumour* of English practical surgery; and the group, on the whole, nearly corresponds to Paget's *recurrent fibroid*. Therapeutic study and pathological study of these tumours were, at one time, unfortunately, very independent of one another; consequently, the varieties of sarcoma have two quite different nomenclatures, one clinical and somewhat old-

fashioned, the other scientific and chiefly German. The latter has almost pushed the former out of the field. First, let us notice chief points in the anatomy of sarcomata, and in doing so, employ a strictly pathological classification (after Billroth), viz., into (1) granulation sarcoma ; (2) spindle-celled sarcoma ; (3) giant-celled sarcoma ; (4) stellate sarcoma ; (5) alveolar sarcoma ; (6) pigmented sarcoma.

Granulation Sarcoma, Round-celled Sarcoma (including *Glioma*), consists of corpuscles like those of lymph. Intercellular substance is homogeneous, striated, or reticulate, varying widely in amount.

Spindle-celled Sarcoma.—Cells acutely spindle-shaped. Intercellular absent or scanty, homogeneous or fibrous. Most recurrent sarcomata contain this tissue ; but every spindle-celled sarcoma does not recur.

Giant-celled Sarcoma, Myeloid Tumour.—In addition to the structural elements of one of the other varieties of sarcoma, these tumours contain large cells with many nuclei, and often with many offshoots.

Net-celled Sarcoma, Mucous Sarcoma.—This is not exactly the same thing as myxoma. Myxomata are sarcomata of various kinds, but agreeing in having a gelatinous appearance. Net-celled sarcomata contain stellate cells with long processes and gelatinous intercellular substance.

Alveolar Sarcoma.—Very rare : great resemblance to carcinoma, but the cells are not so easily detached from the mesh-work in which they lie. The cells are large, and usually lie each in a space to itself, 'embedded in a fibrous, or more rarely homogeneous, slightly developed intercellular substance of exquisite areolar type' (Billroth).

Pigmentary Sarcoma, Melanotic Sarcoma, Melanoma.—Pigment may occur in any variety of sarcoma. The pigment almost always lies in the cells. All the cells mentioned above as occurring in the different varieties of sarcoma are related genetically to corpuscles of the connective tissue (areolar tissue, bone, &c.). Consequently, the cells of a sarcoma are united by processes to the intercellular substance. In these two peculiarities, sarcoma is distinguished from

carcinoma, the cells of which lie free in the alveoli of the cancer, and are genetically related, not to connective tissue, but to epithelial cells.

Naked-eye appearances of Sarcomata.—These do not correspond very exactly to varieties in the kind of cell found under the microscope. In fact, several forms, e.g. spindle-cell, round-cell, and giant-cell, are often found in the same tumour. Some sarcomata and fibro-sarcomata are firm and tense, more or less lobed. On section, they are seen to be intersected with white fibrous bands; and from the pale yellowish colour of the section, an inexperienced observer might readily suppose them to be chiefly fat. They are very succulent and juicy when freshly cut. These are the *fibro-cellular* tumours. Other sarcomata, especially the 'net-celled,' are of loose, gelatinous appearance, even so much so as to trickle away on section, like the vitreous humour of the eye. These are the *myxomata*. Others resemble lean 'flesh,' and, on section, are seen to be blotched with red, though in the main grey, or yellow and shining. Such often contain giant-cells. Finally, tumours which will recur, or have already recurred, are very often soft, and, with each recurrence, tend to get more and more encephaloid or more and more gelatinous. Sarcomata are liable to cystic, calcareous, oseous, and mucous degenerations.

Symptoms of Sarcomata.—Distinct, encapsulated tumours. Usually rounded and smooth, often lobulated. Consistence varies from great firmness to the softness of jelly. When connected with bone, they frequently ossify. Cicatricial shrinkage very rare (this contrasts with carcinoma). Partial mucous softening and cystic degeneration frequently modify the consistence of a sarcoma. Ulceration occurs early in the course of superficial sarcomata, but is not usually very destructive. The tumour may then fungate.

The chief points for the *diagnosis* of sarcoma are thus concisely given by Billroth: 'Sarcomata develop with peculiar frequency after precedent local irritations, especially after injuries. Cicatrices, also, are not unfrequently the seat of these tumours; black sarcomata may come from irritated moles

Skin, muscles, nerves, bone, periosteum, and, more rarely, glands (among these the mamma most frequently), are the seats of these tumours. Sarcomata are rarest in children, rare between ten and twenty years, most frequent in middle life, and rarer again in old age. According to my observation, men and women are affected with equal frequency. If these tumours be not located in or on nerve-trunks, they are usually painless till they break out. If the sarcoma be in the sub-cutaneous cellular tissue or in the breast, it may be felt as an encapsulated movable tumour. The growth is sometimes rapid, sometimes slow ; the consistence varies, so that it can scarcely be used as a point in diagnosis.'

Topography of Sarcoma.—Glioma is connected with the neuroglia of one or other of the nervous parts. It occurs in the eyeball, or attached to one of the cerebral nerves, and is peculiarly a disease of childhood. Myeloid tumours occur in medullary cavity of long bones, but more frequently in lower jaw. When commencing inside a bone, they dilate it to a mere shell at the part affected. In those of the lower extremity, an aneurismal murmur may often be heard. Intra-osseous sarcomata contain giant-cells, and are almost always solitary and innocent. But sarcomata which grow from periosteum are malignant, and generally more or less ossified : sometimes they are myxomata. Those sarcomata which originate in muscular interspaces, in fasciæ and in the skin, are almost always spindle-celled and recurrent, but (at all events, in the first place) not infectious. The typical recurrent fibroid is to be found among these.

In glands, a mixture of adenoma and sarcoma is more common than pure sarcoma. Cysts often form, and into these sarcomatous tissue may grow (proliferous cysts). Thus are formed *sero-cystic sarcomata*. Of the glands, the female breast and the salivary glands are most liable to sarcomata.

'Fibro-cellular' Tumours are sometimes myxosarcomata and sometimes merely fibromata of an unusually soft and oedematous nature. Or they may be a combination of both.

Course and Prognosis of Sarcomata.—Some—e.g. most myeloid tumours—are solitary, perfectly innocent ; recurrence,

when it takes place, being probably due to imperfect removal. Others are not less infectious and malignant than encephaloid carcinoma. 1. Those which grow rapidly are soft, and the softer the tumour the worse the prognosis. 2. The more simple and less differentiated the character of the microscopic elements of a sarcoma, the more dangerous it is. Recurrent fibroids, with each recurrence, are apt to become softer in consistence and more 'embryonic' in microscopic structure. It is strikingly characteristic of sarcoma that it infects the system through the blood-vessels and not through the lymphatics (except in some rare cases quite late in the course of the sarcoma). Contrast this with carcinoma. Different sarcomata present every intermediate grade of infectiousness. Interval between recurrences very variable. Death eventually occurs, in malignant cases, either from the disease recurring in a part where operation is impossible, or from infection (often embolic) of internal organs. Number of secondary sarcomata unlimited. Their favourite internal sites are peritoneum, pleura, and lungs.

Treatment.—Depends to a certain extent on locality; but, as a general rule, prompt excision is indicated. In the case of mammary, subcutaneous, intra-muscular, and osteal or periosteal sarcoma, there need be no hesitation; but adeno-sarcomata of the salivary glands in elderly people are prone to extremely quick recurrence. Excision must be thorough, and include every offset. *Caution.*—Small sarcomata are occasionally overlooked when lying near larger ones. Esmarch claims for pot. iod. in large doses a curative power over recurrent fibroid. Arsenic has cured one or two cases of multiple sarcoma.¹

LYMPHOMA.—(1) Idiopathic disease of the lymphatic glands, or (2) a tumour resembling a mass of lymphatic cells with a stroma of adenoid tissue, but not situated in the site of any normal lymphatic gland. As, microscopically, almost all affections of lymphatic glands are indistinguishable, and as

¹ See Koebel in *Beit. zur klin. Chir.* (Bruns of Tubingen), ii. B. 1, H. 4, a good article on the 'Arsenical Treatment of Malignant Tumours.' Abstract by Van Arsdale in *Annals of Surgery*, Sept. 1886.

so-called 'lymphomata' present every grade from innocency up to intense malignancy, it is obvious that milder cases cannot be separated from mere secondary glandular inflammations or from scrofula. Indeed lymphomata, as a class, have been termed 'scrofulous sarcoma.' But surgeons are generally agreed in setting apart from other glandular diseases, cases like the following : (1) One or more glands, in the neck usually, enlarge and resist treatment. Obstinate anaemia comes on. Suffocation by mechanical pressure may cause death ; or the progressive anaemia—frequently with leucocytæmia—proves fatal. Occasionally the disease is arrested by treatment, or even spontaneously. Various glands in other parts of the body often enlarge also. (2) Glands enlarge quickly to soft 'medullary tumours,' the lymph-corpuscles simultaneously infiltrating the neighbouring tissues. Anaemia and marasmus come on and advance rapidly to a fatal result. Excision is followed by recurrence. Systemic infection may take place. Prognosis is almost hopeless. Lymphomata may be also classified as follows : '(1) The simple or benign lymphomata ; (2) the malignant lymphomata, or lympho-sarcomata of Virchow ; (3) multiple lymphomata of the viscera (e.g. the liver, spleen, kidney, &c.), Hodgkin's disease, anaemia lymphatica, adénie ; (4) the last-mentioned group associated with a marked increase in the number of white blood-corpuscles (leucæmia, leucocytæmia).'¹ *Anatomy* of lymphoma.—All the cellular elements of the gland are multiplied and enlarged ; 'the structure of the gland is gradually lost entirely ; the whole organ becomes a mass of lymph-cells, although a fine network is generally preserved.' 'The blood-vessels are preserved and their walls greatly thickened.' *Treatment*.—At first try anti-strumous remedies : cod-liver oil, iron, &c. Iodine injections, electrolysis, and compression appear to succeed occasionally, but rarely. Excision may be performed when the glands are distinct and are causing local trouble. Billroth has treated malignant lymphoma successfully with arsenic (liquor arsenicalis, tinct. ferri, ææ m.v. bis die). Increase by one drop every second or third day till symptoms of poison-

¹ Pepper's *Surgical Pathology*, p. 474.

ing appear. Then diminish by one drop every second day. (See *Allgemeine Med. Cent. Zeit.*, May 16, 1877.) Excision of the spleen has been frequently tried in cases of leucocythemia, but with a universally fatal result. Leucocythemic patients are very subject to severe haemorrhages, external, internal, subcutaneous, &c.

PAPILLOMATA.—Include *warts* and *horny excrescences*. Papillomata are formed of hypertrophied cutaneous papillæ, covered by hypertrophied epidermis. Warts usually show each papilla, with its thickened epidermal covering, distinct to the naked eye. The ordinary wart is too well known to need description, but there is a disease described by Sir Erasmus Wilson as *verruca confluens*, in which a considerable area of skin becomes the seat of a warty growth. Syphilitic and gonorrhœal condylomata are more like hypertrophied granulation-tissue than like true papillomata. *Causes.*—Unknown. Much more common before than after puberty. Irritating fluids, such as the hands of the post-mortem clerk are exposed to, often cause a warty state of the skin. *Treatment.*—Shave off the non-vascular summit and apply some caustic. Nitrate of silver, strong nitric acid, glacial acetic acid, acid nitrate of mercury. Milder applications may suffice, e.g. strong tinct. ferri perchlor. For gonorrhœal warts, try powdered sulphate of copper with powdered savin; and for syphilitic, calomel, with oxide of zinc. Dr. Verco has observed a severe crop of common warts disappear rapidly during a sea voyage. *Horny excrescences* in man are epidermal in structure, with a papillomatous base. *Treatment.*—Shave off and then roughly cauterise base or excise base. Some radical operation quite necessary, or they grow again, and may become starting-point of epithelioma. Galvano-cautery may be tried.

ADENOMATA.—*Partial Glandular Hypertrophy.*—Tumours containing some proportion of glandular structure. This is usually mixed with some other tissue, and the relative proportions vary much. Thus are produced *adeno-fibroma*, *adenosarcoma*, &c. Microscopically, they are characterised by the presence of tissue resembling tubular, and sometimes racemose glands. By great dilatation of the tubules, cysts may be formed.

In shape the tumours are usually round or oval, and lobed, but their other physical characteristics depend greatly upon the kind of tissue which accompanies the adenomatous—e.g., an adeno-myxoma would be very soft, an adeno-chondroma usually very hard. Any innocent, smooth, round, lobed, and elastic tumour, situated in the breast, or in the parotid, is very likely to be, at all events partially, adenomatous. Billroth says that he considers true adenoma of the breast to be very rare, the glandular tissue found in mammary sarcomata being merely part of the original acini of the organ. Nasal, uterine, and rectal polypi are often partial adenomata ; solid or semi-solid bronchoceles are adenomata. *Treatment.*—Pedunculated adenomata can be removed by polypus-forceps, by ligature, by écraseur or by scissors, or by combinations of ligature and scissors. *See POLYPUS OF NOSE, and of RECTUM.* For treatment of thyroid and mammary adenomata, *see BRONCHOCELE and BREAST* respectively. It may be shortly stated that excision is the usual treatment, but that no tumours are so frequently cured spontaneously, or without operation, as adenomata.

CYSTIC TUMOURS, CYSTOMATA, CYSTS.—*Definition.*—‘A tumour formed by a sac filled with fluid or pulp.’ *Varieties.*—The names of cysts have been given on principles nearly as various as those on which human beings have been named. Thus we have—I. (1) Simple and (2) compound cysts. II. (1) Extravasation, (2) exudation, and (3) retention cysts. III. (1) Serous, (2) synovial, (3) mucous, (4) blood, (5) sebaceous, and (6) proliferous cysts. IV. Congenital cysts. The four classifications being based respectively on number, on mode of origin, on contents, and on period of origin. (Proliferous cysts are those which contain growths within them. They are practically identical with ‘compound cysts.’ All other cysts are ‘simple.’) *Causes.*—Extravasation cysts are due to extravasation of blood. They are usually traumatic. *See HÆMATOMA.* Exudation cysts, at least such as are ordinarily regarded as tumours, are of unknown origin, except such as arise from local irritation. Retention cysts are due to obstruction of the orifice of some gland causing dilatation behind it. It ought to be noted that the class ‘exudation

cysts' is by Virchow considered to include such serous dropsies as hydrocele, ganglion, and hydrarthrosis ; while 'retention cysts' include even dropsy of the gall-bladder, dilatation of the Fallopian tubes, and so on. We shall now consider the anatomy, diagnosis, prognosis, and treatment of each variety of cyst separately.

SEROUS CYSTS.—*Seat.*—Most commonly in or near glands, kidneys, thyroid, breast, sublingual, &c. When in the neck, they are called 'hydrocele of the neck.' They may occur almost anywhere and in any tissue. *Contents.*—Fluid usually thin, but sometimes honey-like, usually yellow and clear, but may be dark even to blackness. *Walls* of connective tissue lined with tesselated epithelium. *Number*, various. *Growth* is usually slow. *Diagnosis.*—Not difficult when the fluid is thin and the cyst not tensely filled ; but a very tense cyst may be mistaken for a solid growth. The practised touch usually suffices to distinguish the fluctuation of a cyst from the elasticity of an adenoma, a fibro-cellular, or other soft solid tumour. The latter are more likely to be lobed, and possess various special characters described above. *Abscesses* may be recognised by the history, by considering locality, age, pain, &c. It is not often very important to make a diagnosis before puncturing. *Treatment.*—Free antiseptic incision. Drainage. Iodine injections. See also *Bronchocele*. Excision. Multiple cysts may require excision of a whole affected gland. When the cyst is not complicated with some recurrent solid growth, and when operations on it are performed with due care, prognosis is most favourable.

MUCOUS CYSTS.—Type, *RANULA*, *q.v.*

BLOOD CYSTS, SANGUINEOUS CYSTS.—Are either serous cysts into which haemorrhage has occurred, or else haematomata. *Treat* on the same principles as serous cysts and haematocele of the tunica vaginalis. Blood-cysts frequently occur in malignant tumours, in which they are, of course, of quite secondary importance.

CUTANEOUS CYSTS.—Under this head may be considered *sebaceous* and *congenital cutaneous cysts*.

SEBACEOUS CYSTS are of two kinds, one of which shows the

punctiform vestige of the orifice of the follicle by whose obstruction the cyst has been produced, whilst the other does not. The vestige above mentioned is a dark point which can usually be found. *Locality*.—Anywhere, but especially head and face. *Walls* usually soft connective tissue. *Contents*.—White, pulpy epidermal matter, mixed with crystals of cholestearine, often offensively smelling. *Colour* occasionally brownish, and consistence sometimes very soft. *Shape* round, smooth, often changeable by pressure. *Growth* slow. *Age* of first appearance, before middle age; but the surgeon is not usually consulted about them at first. They have to be diagnosed from chronic abscess and other soft innocent tumours. Note the characters mentioned above. *Locality*; history, absence of quick elasticity; and presence of the black point are important.

CONGENITAL CUTANEOUS CYSTS.—*Locality*.—In or near orbit, often deep-seated. May extend through aperture in bone, even into cranial cavity. Walls very thin. *Contents* usually turbid, oily fluid. *Size* small (half an inch). *Diagnosis*.—From naevus, lipoma, and from serous cyst. Congenital cutaneous (dermoid) cysts occur also in other parts of face and neck, besides the orbit, but always in the lines of the branchial clefts. Hence their possible origin from the accidental enclosure of dermal tissue when these clefts closed.—Verneuil. (See Wagstaffe, *Path. Trans.*, 1879.) Congenital dermoid cysts of the head sometimes perforate the cranium, and then may be confounded with meningocele or encephalocele. This is not so serious a mistake as the converse. *See MENINGOCELE*. *Treatment of the Cutaneous Cysts*.—1. Dilate the black punctiform opening with a probe, and squeeze out contents. Repeatedly squeeze out if they re-form till the sac has time to obliterate itself. 2. Cauterise (to the size of a sixpence) with potash or strong nitric acid. Afterwards pull cyst out through the opening. 3. Incise skin over tumour, seize with forceps, and dissect out. Operation easy unless inflammation has taken place. *Antiseptics*.

COMPOUND CYSTS. PROLIFEROUS CYSTS.—*Definition*.—Cystic tumours containing growths. When these growths are them-

selves cystic, the tumour is called a *cystigerous cyst*. But the growths are usually solid. Excellent examples of cystigerous cyst are furnished by many ovarian tumours.

NOTE.—Many cysts clustered together do not in themselves constitute a compound, but a multiple cystic tumour.

Anatomy of Proliferous Cysts.—The solid intra-cystic growths appear to grow from one point in the wall of the containing cyst. They gradually fill up the containing cyst, displacing the fluid which previously occupied it. Sometimes cysts and their contents cohere altogether, so that only the appearance of a section indicates that the tumour has ever been cystic at all. The nature of the intra-cystic growth is usually sarcomatous or adeno-sarcomatous. Their physical characters are as various as possible, flat or arborescent, soft or hard, pale or dark red. And they may be themselves cystigerous.

Diagnosis.—Locality almost always some gland—breast, thyroid, &c. Their general characters resemble so closely those of adenoma and fibro-cellular tumour, that unless palpation discovers evidence of fluid in some parts, and of solid in others, diagnosis will probably be impossible. Skin quite healthy unless the tumour fungates. Age—most commonly between thirty and forty. The chief practical indication is to distinguish them from cancer. This is done on the general principles by which other innocent tumours are thus distinguished.

Prognosis.—Usually favourable. Prospect of recurrence if the whole tumour be not removed, or if the solid part of the tumour be soft and sarcomatous. *Treatment.*—Thorough excision.

CARCINOMATOUS TUMOURS. *See CANCER.*

Ulceration.—One of the ‘terminations’ of inflammation. The destruction of a part by gradual molecular disintegration, distinguished from gangrene by the fact that in the latter process the dead particles cohere together after their death, and form masses visible to the naked eye, whereas in ulceration the disintegrated tissue falls away in granules or pieces of microscopic size, or else is absolutely liquefied. The liquid in which the particles flow away is called ‘discharge’ or ‘ichor,’ and varies with the character of the ulceration. *Chief varieties of discharge.*—1. Thin and serous, containing granules, débris,

and sometimes a little diffused blood (sanguinolent), or a little pus (purulent). 2. Foul, quickly decomposing, sometimes containing shreds of gangrenous tissue. 3. 'Laudable' pus, which consists almost entirely of serum crowded with pus-corpuscles, which are leucocytes escaped from the blood-vessels. Its creamy appearance well known. Contagious discharge may assume any of the above appearances. The first kind flows from spreading ulcers, the second from still more active ulcerations (phagedæna), the third in moderate amount from healthy, healing ulcers.

CLASSIFICATION OF ULCERS (Paget's). I. (Type). Simple or healthy ulcer. II. Varieties depending on constitutional causes (eleven) :—1, inflammatory ; 2, eczematous ; 3, cold ; 4, senile ; (5, strumous ; 6, scorbutic ; 7, gouty ; 8, syphilitic—strictly constitutional) ; 9, lupous ; 10, rodent ; 11, cancerous. To these may be added neurotic ulcers, *e.g.* those attacking the foot in cases of locomotor ataxia, and certain parts, *e.g.* the nose, in connection with disease or injury to the skull, irritating the brain. Other instances are the ulcerations occasionally seen in regions corresponding to the distribution of injured nerves, especially the fifth ; also the sloughing bed-sores which sometimes form over the sacrum after injury to the posterior lobes of the brain, or to the spinal cord, although pressure is at least an equally important factor in the causation of these. III. Varieties depending on local conditions (eight) : 1, varicose ulcer ; 2, edematous ; 3, exuberant ; 4, haemorrhagic ; 5, neuralgic or irritable ; 6, inflamed ; 7, chronic or callous ; 8, phagedænic and sloughing. It is customary in describing an ulcer to notice its (1) locality, (2) shape, (3) size, (4) base, (5) border, and (6) secretion.

Simple or Healthy Ulcer.—Arises from loss of substance due to accident or to some pre-existing, but now past, diseased condition. Locality, number, shape, and size—very variable. Base—covered with small red granulations, not painful and not readily bleeding, neither raised nor much sunk below level of surrounding skin. Border—outer circle of thin white new epidermis, inner circle of still thinner (and therefore) blue epidermis. Pus, if present, laudable. *Treatment.*—Merely

protective, *e.g.* boracic ointment on lint, and avoidance of irritation. *Process of Healing.* Identical with that of superficial wound with loss of substance.

INFLAMMATORY ULCER.—Locality: usually lower part of shin. Shape, irregular. Size: usually less than an inch. Base: without granulations, raw and sloughy. Edges, abrupt. Discharge thin, acrid, often blood-tinged. Surrounding skin inflamed, oedematous. *Causes.*—General causes of inflammation, especially constant local irritation, bad diet, old age, and drink. *Treatment.*—Rest, elevation, boracic lotion, poultices, warm lead-lotion, followed in twenty-four hours by Martin's elastic bandage. Or the bandage may be applied without any preparatory treatment.¹

ECZEMATOUS ULCER.—Resembles the last-mentioned (inflammatory) in character, but appears in the middle of a patch of eczematous skin, in the vesicles of which it has often originated. Sometimes its immediate cause is a slight injury. *Treatment.*—Treat surrounding eczema, *e.g.* with zinc ointment. But the sore itself must be managed as an inflammatory ulcer. Elastic support, *e.g.* by Martin's bandage. Danger of causing internal disease by curing eczematous ulcer (? ?).

COLD ULCER.—Resembles chilblains, and occurs on fingers and toes of people with feeble circulation and cold, congested extremities, especially young women with deranged sexual function. Aloes, iron, warm gloves, thick boots, free exercise in open air. Stimulating lotions, *e.g.* zinc sulph. (gr. iiij.— $\frac{3}{4}$ j.).

SENILE ULCERS.—Kind of *inflammatory* ulcer, occurring in withered old people. Nearly related to senile gangrene, with which it may be combined. *Vide SENILE GANGRENE.* Locally: resin ointment and Peruvian balsam. Iodoform.

STRUMOUS ULCERS.—Locality: neck, groin, knee, ankle, elbow, wrist, and sometimes elsewhere. Often multiple. Shape: oval when single. Size: small singly, but often very large by

¹ The case must then be carefully watched, for there is a danger of making matters worse. Iodoform is a valuable application to almost any ulcer. Boracic lint, moistened with boracic lotion, and covered with oil-silk or gutta-percha tissue, is both antiseptic and soothing to some painful ulcers. A capital dressing of frequent applicability is made by dredging on the ulcerated surface a powder of equal parts of bismuth subnitrate, iodoform, and oxide of zinc. It cures the eczema caused by sublimate or carbolic dressings like magic.

coalescence of several. Edges undermined. Base soft, granulations large, readily bleeding, edematous. Discharge, thin, greenish pus. *Treatment.*—That of *scrofula*. Locally : stimulant. Ung. hydrarg. oxid. rubri, unguentum plumbi, lotio iodi (tinct. iodi c. aquâ), on strips of lint. Erosion. Iodoform.

SCORBUTIC ULCERS occur in the course of scurvy, and are covered with crusts of the characteristic blood-clot deposit of scurvy. Indolent and livid. *Vide SCURVY.*

GOUTY ULCERS.—Superficial, indolent, occur in gouty parts, especially over gouty deposits. Discharge itself leaves a chalky precipitate. *Treatment.*—Boracic lint dressing. In absence of inflammation, sol. argent. nit. (gr. v. aquæ ʒj.) may be used.

SYPHILITIC ULCERS.—Primary syphilitic ulcers (*i.e.* chancre) may occur on lips, hands, &c. For their characteristics *vide SYPHILIS*. Secondary eruptions rarely ulcerate : secondary ulcers are known by their concomitants. Tertiary include almost all the cutaneous ulcers named syphilitic. Commence in two ways : 1, cutaneously (usually in rupia) ; 2, subcutaneously (a gumma ulcerating outwards). The two varieties agree in occurring anywhere, in having abrupt edges, in often being surrounded by a red areola, in being associated with a syphilitic history (perhaps merely congenital), and in benefiting by anti-syphilitic treatment, especially iodide of potassium ; but they differ considerably. 1. *That which begins superficially* has for its favourite locality the trunk. Shape : annular, crescentic, or circular. Size : various. Base : level, crimson. Granulations : small or absent. Discharge concretes into scabs, often rupial in character. Not generally simultaneous with any other syphilitic manifestation. One of the earliest tertiary manifestations. 2. Deep tertiary syphilitic ulcers are caused by a gumma finding its way outwards through ulceration of the skin. Locality : anywhere—usually limbs near the large joints. Shape : rounded. Size : about an inch ; usually multiple. Edges : abrupt. Base : excavated, often covered with 'gummy deposit' sloughed. They have to be diagnosed from strumous ulcers. The latter have a pink surrounding area, the former usually a dusky red one. *Treatment of tertiary syphilitic ulcer.*—Locally : stimulant mercurial ointments, *e.g.* ung. hyd. oxid.

rubri, or ung. hyd. nitrico-oxid. or lotio nigra ; iodide of potassium, gr. v.-x. ter die. Small doses of liq. hydrarg. perchlor. &c. *Vide SYPHILIS.*

LUPOUS ULCERS, RODENT ULCERS, and ULCERATING EPITHELIOMA may be usually contrasted as follows :—

Lupous Ulcer	Rodent Ulcer	Ulcerating Epithelioma of the Skin
Locality : most frequently face, especially tip or alæ of nose, upper lip, cheek. Female external genitals. Anterior and inferior part of nasal septum. Pharynx.	Most frequently cheeks, eyelids, upper lip, nose, scalp. Also vulva, vagina, areola of breast, near anus, &c.	Great majority occur on lower lip, lower eyelid. Other places where skin and mucous membrane join, e.g., anus, vulva, prepuce. Also scrotum, back of hand, and any other part of skin.
Borders : abrupt, irregular, sometimes slightly elevated or thickened, very rarely undermined.	A abrupt; perhaps with low tubercles near, never undermined, not everted; tough, hard.	Generally raised, everted, hard, nodular, warty.
Base : more or less level. Granulations nearly absent, or else coarse and dusky.	Smooth, dull reddish-yellow, looking half-dry and glossy, void of granulations. Base feels tough and hard, as if bounded by a layer of indurated tissue half a line to a line in thickness.	Uneven, concave, hard, nodular, warty, fissured. Coarse granulations. Base and surrounding parts hard, thickened, and infiltrated with cancer.
Often scabbed over.	Very little discharge indeed.	Often scabbed over when small.
Preceded by pink, firm, flattened tubercles.	Commences in some tubercular or scaly spot of long duration.	Begins in many ways—tubercles, warts, ulcers, fissures, cicatrices, &c.

The course of each is destructive to every neighbouring tissue. Progress usually slow, always sure. Rodent ulcer frequently coexists with perfect general health. The same may be said of epithelioma ; but epithelioma is, of all the three, most usually painful and productive of cachexia. Epithelioma alone involves, secondarily, the glands ; and the infection may spread to the entire system. This is what constitutes its truly cancerous nature. Rodent ulcer would only be described as semi-malignant. The last sentence is meant to be understood

in a purely clinical sense. Pathologically, 'Rodent ulcer' is as truly carcinomatous as epithelioma, according to Billroth.¹ Lupus is pathologically allied to tubercle, *quod vide*. A large proportion of cases are attacked with pulmonary tuberculosis. *Treatment*.—Lupus: scrape the disease away with Volkmann's spoon. Iodoform. Anti-scerulous remedies: cod-liver oil, &c. Rodent ulcer: thorough destruction with cautery or caustic. Benzoline cautery. Among caustics, arsenic is very convenient, but unsafe except in case of very small sores; nitric acid acts rather superficially; Vienna paste and chloride of zinc paste are the best deep caustics. For treatment of cancerous ulcers, *vide* CANCER. Lupus often returns. Rodent ulcer, if completely extirpated, rarely returns. Prognosis after operation for epithelioma depends on whether or not time has been given for glandular infection.

For other cancerous ulcers, *see* CANCER.

SECTION III.—VARIETIES OF ULCER DEPENDING ON LOCAL CONDITIONS.—They do not need a full description, as each term owes its existence to some single important condition grafted on one or other of the ulcers already described. The nature of this characteristic, together with causation, diagnosis, and treatment, has to be considered.

VARICOSE ULCER.—Its characteristic is, that it owes either its origin or continuance mainly to the existence of varicose veins. Two direct modes of origin: (1) in suppuration over a thickened varix; (2) in eczema caused by obstructed cutaneous circulation. Form assumed by varicose ulcer is that of inflammatory, of eczematous, or of chronic ulcer, *q.v.* The *Treatment* is according to the particular nature of the individual ulcers. But always, either rest and elevation or else pressure. Martin's bandage. Give iron internally.

The terms *œdematous*, *exuberant*, and *hæmorrhagic* refer to the state of an ulcer's granulations, and almost explain themselves. *Œdematous* granulations are usually connected with diseased bone. *Exuberant* granulations have to be diagnosed, by their softness, from cancer. An ulcer may be *hæmorrhagic*

¹ Paget inclines to the same view. But Thin says that rodent ulcer is an adenoma of the sweat-glands.—*Path. Trans.*, 1879.

from (1) vicarious menstruation, (2) small and diseased varicose veins, (3) scurvy, (4) haemorrhagic diathesis, (5) phagedæna, (6) malignant disease, (7) mere accidental injury or congestion. In the case of œdematosus and haemorrhagic ulcers it is necessary to treat the cause. Pressure and caustics will destroy œdematosus or exuberant granulations. The popular name for the latter is 'proud flesh.'

NEURALGIC OR IRRITABLE ULCERS.—Usually more or less inflamed, or subject to constant irritation, *e.g.* fissures round anus or mouth. If soothing ointments, cleanliness, and local rest will not cure them, a touch of solid caustic may. Carbolic lotion is an excellent local sedative. Also *see ANUS, FISSURE OF.*

INFLAMED ULCER.—Recognised by the presence of the four classical signs of inflammation in the borders of the ulcer. Surface of ulcer also changes, becomes 'angry-looking,' dusky, swollen, perhaps sloughy. *Treatment.*—Rest, elevation, weak carbolic or lead lotion. Purgatives. Occasionally, poultices are convenient.

CHRONIC, INDOLENT, OR CALLOUS ULCERS.—Seat: almost always the leg. Border thick, hardened, brawny, abrupt, covered with thick, old, opaque epidermis, and devoid of any delicate new epidermis such as surrounds a healing ulcer. Base: sunken, pale, or dusky, without granulations, usually insensitive. Secretion: thin, offensive. Various kinds of ulcers attain this condition through neglect or continued irritation, combined with feeble local circulation. *Treatment.*—Pressure. Martin's bandage. Baynton's dressing (strapping with adhesive plaster). Covering ulcer and its borders with a blister. *See Syme's 'Essays.'* A few cases of chronic ulcer justify amputation.

PHAGEDÆNIC AND SLOUGHING ULCERS. *See GANGRENE and SYPHILIS.*

Urethra, Fistula of (usually called 'urethral fistula').

Urethra, Rupture of.—Cases of this may be classified¹ into three varieties:—(1) rupture behind an old stricture, (2) rupture due to injury without fracture of neighbouring bone,

¹ See paper by Joseph Bell in *Edin. Med. Journ.*, Dec. 1881.

(3) rupture due to injury, and complicated with fracture. Allied to these, but incomparably less severe, are the lacerations occasionally produced by surgical instrumentation, and even by the passage of calculi.

For the third class—namely, that complicated by fracture of the pelvis and laceration of the pelvic fascia—Bell gives this advice : Do not catheterise, but tap the bladder above the pubes with the fine needle of the aspirator, and repeat the procedure every 8 or 12 hours for at least ten days. In any other case of ruptured urethra, a gentle attempt should be made to pass a soft catheter. If successful, leave it in. If not, a silver one may pass, but it is usually a distressing instrument to leave in. In difficult cases, do not wait for extravasation to occur, or spend time in painful and rough attempts to catheterise. Choose between (1) aspiration, as mentioned above, and (2) perineal section (perhaps the best plan in case of old stricture). *See EXTRAVASATION OF URINE.*

Urethra, Stricture of.—*Classification* : (1) spasmotic, (2) inflammatory, (3) organic. Organic are—A. Of neoplastic origin : (1) annular, (2) indurated annular, (3) diffuse or tortuous, (4) bridle, (5) caruncle, (6) traumatic. B. Of heteroplastic origin : epithelioma, &c.

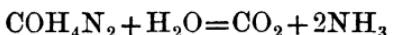
Causes.—*Of Spasmotic Stricture*: almost always an organic predisposing cause, situated within the urethra. Dyspepsia or gouty diathesis with consequent acid state of the urine. Irritating diuretics, *e.g.* cantharides. Some foreign body, *e.g.* passage of a bougie or of a minute calculus. Some disorder of the central nervous system. *Of Inflammatory Stricture*: exercise, excitement, alcoholic or other excess during course of a gonorrhœa. *Of Organic Stricture*: the great majority arise from chronic gonorrhœa or gleet. Some follow non-specific urethritis. *Vide* causes of urethritis. Traumatic strictures follow rupture of the urethra. Abuse of alcoholic drinks, especially malt liquors. Neglect of proper treatment in gonorrhœa. Caustics. Syphilitic ulceration of meatus.

Position.—Spasmotic stricture occurs in various parts of the urethra. Inflammatory stricture is due to acute inflam-

mation of the prostatic part. Of organic strictures, two-thirds are in the *bulbous* part of the urethra, *i.e.* in the posterior inch of the spongy part (Thompson). This is denied by Otis, who says that strictures are most common in the penile part of the urethra. For confirmatory observations, see Lockwood, *St. Barth.'s Hosp. Rep.*, 1879.

Signs.—Earliest symptom is usually a slight gleet (almost all obstinate gleets are said to be caused by stricture). Sometimes retention is the first sign of all. Altered size and shape of stream—small, twisted, spiriting, forked, or even divided. A few drops of urine trickle away after micturition has apparently been completed. Commencement of the act of urination difficult and slow, act itself prolonged. *Advanced Symptoms.*—Constant desire to make water. Night's rest broken. Straining. Sense of heat, soreness, and smarting about neck of bladder, 'greatly aggravated by an excess of acid in the urine, by cold, or imprudence of any kind telling on the parts.' Pain in pubic region, in perinæum, back, and loins. Pain during coition. Semen may recoil back into bladder. In some stricture cases a discharge like that of gonorrhœa may follow sexual intercourse. Anus shows effects of straining—prolapsus and haemorrhoids. In a few cases, almost the only marked symptom is the liability to attacks of retention.

Urine tends to become alkaline and ammoniacal.



urea + water = carbonic acid + ammonia, is the reaction which represents transformation of urea into carbonate of ammonia. This ammonia irritates the bladder, causing cystitis. The urine contains also triple phosphates in abundance, as well as pus and mucus, owing to the cystitis. Occasional haematuria, from rupture of vessels near stricture during erection of penis.

Complications.—1. Dilatation of urinary passages and organs posterior to stricture—prostatic part of urethra, bladder, ureters, kidneys. 2. Atony and absorption of same structures; kidney may suffer great atrophy of its substance. 3. Inflammations and suppurations of the same parts, especially of bladder and

kidneys. 4. Incontinence of urine. 5. Rupture of the urethra or bladder, and extravasation of urine. 6. Chronic abscess and fistula. 7. Constitutional effects. For most of the above complications, see notices elsewhere, *e.g.* BLADDER, DISEASES OF, KIDNEY, URINE, &c.

Constitutional Effects.—Loss of strength. Impaired digestion. Thinness. Careworn look. Irritability. Despondency. Pains in back and loins. Feverishness of intermittent character. Urethral fever may be excited by the passage of a bougie, especially if the instrument be comparatively large. When there is organic kidney-disease, catheterism almost always causes rigors. Then death may also ensue suddenly. See p. 441.

Diagnosis is usually settled by passing instruments. History of case may help to demonstrate nature and cause of the stricture. Act of micturition should be observed.

Prognosis.—Very good if stricture be treated early. Serious, if neglect has allowed kidney-disease to supervene. Tendency to relapse.

Treatment.—The immediate treatment of strictures (whether inflammatory, spasmotic, or organic) in which there is retention of urine will be considered under the head URINE, RETENTION OF. Treatment of strictures in which there is no urgent retention—Varieties may be classed as follows: (1) dilatation, (2) rupture, (3) urethrotomy. These three classes include at least eight methods—viz. : (1) intermittent dilatation, (2) continuous dilatation, (3) 'vital' dilatation, (4) rupture, (5) dilatation from behind—Jordan's operation, (6) electrolysis, (7) internal urethrotomy, (8) external urethrotomy, (9) perineal section.¹ 1. Dilatation—Instruments: silver, gum-elastic (English), or French catheters or bougies. The soft French instruments are preferred to silver ones by the majority of people accustomed to both. Sir Henry Thompson strongly recommends them. The English gum-elastic has the advantage that it can be moulded to any curve in warm water, and stiffened in the new curve by plunging it into cold

¹ To these should be added dilatation by Wakley's tubes, which glide one over the other, and the smallest over a small silver catheter.

water. Silver catheters permit their points to be directed with greater precision than soft ones. The advantage of using a catheter instead of a bougie, is only that the former instrument, by giving passage to urine, tells you when it has entered the bladder. French instruments usually taper near the end, but have the end itself knobbed to prevent catching in the urethral lacunæ. Hence the name 'bougie à boule.' The French sizes, No. 3 to No. 21, correspond nearly to our No. 1 to No. 12 : the number of each size of the former scale representing the number of millimètres in its circumference. Catgut and whalebone bougies are also used for very narrow strictures. Garrison's 'filiform bougie lengths.' They are very long soft bougies, each gradually increasing in size from one end, which is filiform, towards the other. They are used for continuous dilatation, being pushed further and further through the stricture day by day.¹

Rules for Ordinary Catheterism.—1. Patient may stand upright with his back against the wall ; but as he may faint, it is safer for him to lie down on his back. 2. Stand on patient's right if he is lying down. Sit in front of him if he is upright. In difficult cases bring the patient to the foot of the bed, and sit or stand between his legs. 3. See that catheter is clean and not blocked up. 4. Warm it slightly. 5. Oil it well. 6. Steady the penis with your left finger and thumb, and, holding the instrument lightly between the thumb and two fingers of your right hand, pass its point five inches down the urethra, that is as far as it will easily go while the instrument is in its present position (that is to say, with its handle parallel to the patient's left groin). 7. Bring the handle up to the middle line of the abdomen, keeping the point of the catheter well down the urethra. 8. Lightly depress the handle, at the same time pushing the point onwards round the sub-pubic curve into the bladder, employing only the slightest degree of force with the lightest hand possible. By 'depress the handle' is meant 'bring it downwards, from the linea alba towards the interval between the thighs.' When in the bladder, the catheter should

¹ Silver catheters (and trocars, &c.) can be thoroughly disinfected by passing the steam of boiling water through them. To effect this they have only to be fixed in the cork of a steamer. (Thudichum.)

be parallel with the thighs, or nearly so. Difficulties : (1) point may entangle in lacunæ in roof of urethra, or in a false passage ; (2) or may be obstructed by the anterior layer of the triangular ligament, through which the urethra passes about six inches from the meatus ; (3) or by spasm ; (4) or by an elevation near prostate or neck of bladder. At first keep the point on the floor of the urethra. Always be patient and gentle. Force can do no good, and may cause much harm, especially false passages, haemorrhage, and pain.¹ Gum-elastic catheter : be very careful to preserve its curve. When you have got the point well down the urethra, depress the handle rather suddenly, but still with a light hand. French soft instruments : simply push them gently on into the bladder. *Indications* for treatment of stricture : (1) to restore normal size of urethra (or to dilate as much as is consistent with safety and comfort) ; (2) to maintain the ground gained. At the first examination of a case of supposed stricture—1. Pass, or try to pass, a medium-sized instrument. If it passes very easily, try a larger and a larger, till you find the largest which passes without much pain. Note the size and position of the stricture. 2. If it will not pass, let the patient make water, if he can. The size of the stream will usually be a little larger than the diameter of the stricture. 3. If he cannot make any stream of water, carefully examine hypogastrium to see if bladder be distended. A finger in the rectum to palpate base of bladder may assist in this examination. 4. If you have seen a stream of water, take an instrument a little smaller than that stream, and try to pass it. 5. But if there is no stream of urine, or if the instrument advised in last plan (4) have failed, try the smallest soft French catheter you possess. 6. If this fails, try your finest bougie or catgut or Thompson's probe-pointed catheter, or Maisonneuve's conducting bougie (if you possess them.) Each instrument should have a fair and patient trial. Use plenty of oil. Sir H. Thompson directs it to be injected into the urethra. Another plan is to inject it in steadily at the very same time that you are gently pushing on your fine bougie. The stream of oil, entering the stricture, may carry the point

¹ See 'Dangers of Catheterism,' at end of this section.

of the bougie with it. Sometimes a bougie will pass with ease at the moment when a patient is being made to urinate or to break wind. 7. If the stricture resist all this, put the patient to bed, and if there is no immediate retention, reserve him to be treated as a difficult case. In the meantime, tincture of opium, hot baths, and rest in bed may bring his stricture to a state of easy permeability.

Dilatation, according to the ordinary plan, is thus managed. An instrument as large as the patient can comfortably endure is passed the first day. Then, at intervals of about two days, more or less according to the patient's urethral sensibility, a larger and a larger size are passed, till No. 14 (English) is reached. Modern opinion is opposed to resting content with No. 12. If any attempt is made to hurry the steps of this treatment, the severest rigors and urethral fever may result. Some cases show similar serious symptoms if the surgeon tries to dilate beyond even No. 7 or 8. Such cases may get on very well with that calibre of urethra, and require no further treatment. Each instrument should be taken out as soon as it is passed. After ten minutes' horizontal rest, the patient may go about his business again, provided no unpleasant symptoms ensue. Extra precautions should, if possible, be taken when catheterising a patient for the first time. Then warmth and a day or two in bed are desirable as after-treatment.

Continuous Dilatation.—The instrument is not withdrawn for forty-eight hours, and then only to have a larger size substituted for it. This is an especially good plan (*a*) when the instrument has been introduced with difficulty; (*b*) when false passages exist; (*c*) if ordinary dilatation is ineffective; (*d*) if each introduction of the instrument induces pain or rigors. Of course the bed must be kept during the treatment (*i.e.* for a week or two). The catheter or bougie, when in, can be fixed by tapes or strapping (*vide* works on bandaging, &c.), or by tying it with thread to the hair of the pubes. A cradle keeps the bed-clothes off the hips, &c. Liq. opii sed. mxx. , or morphia suppositories, will relieve severe pain. Some patients cannot endure the treatment at all. Orchitis is a possible complication. Diarrhoea may require chalk mixture. Hæmorrhage

may occur. Slight purulent discharge accompanies the treatment.

*'Vital' Dilatation.*¹—When instrument will not pass through stricture, and there is yet no retention, pass a bougie down to stricture and leave it. Perhaps in a day or two it will pass.

Electrolysis has lately been introduced into England as a treatment for stricture by Messrs. Bruce Clarke and Stevenson (*Roy. Med.-Chir. Soc. Trans.*, 1886).

Rupture by Holt's Dilators.—Mr. Holt passes an instrument consisting of two parallel blades, with a central guide, and then forcibly driving a tube down between them, ruptures the stricture. Give ether. Use sufficient force. Pass a No. 10 catheter immediately. Remove it at once, and pass it again at intervals of two days in first week, then once a week, then once a fortnight, lastly once a month.

'Stretching' (R. Harrison) : Holt's dilator gradually applied during from ten to thirty minutes, 8 dilating rods being used. See *B. M. J.*, Dec. 10, 1881.

Dilatation from Behind.—In certain cases, impermeable from the front, Mr. Furneaux Jordan has plunged a bistoury into the membranous part of the urethra, from the rectum, adjacent to which the membranous urethra lies. This is done by placing the patient in the lithotomy position, feeling for the anterior border of the prostate, and cutting in the median line. Then a bougie is insinuated from behind forwards, through the wound.

Internal Urethrotomy.—Various forms of urethrotome. Some cut from behind forwards; others from before backwards in almost all cases with a guide previously passed through stricture. Suitable cases are those strictures which either cannot be dilated beyond a small calibre, or which rapidly recontract after dilatation. *Operation* (with Civiale's urethrotome) : Ascertain position and extent of stricture, or strictures, by means of bulb at end of instrument. Pass the urethrotome so far down the urethra that when the blade is projected the incision shall commence about $\frac{1}{2}$ inch beyond the

¹ Dupuytren, *Leçons Orales*.

stricture. Pull out the instrument, incising the urethra for about $1\frac{1}{2}$ inch altogether. The edge of the blade is generally turned towards the floor of the urethra. There is no danger in a long incision, but real danger in incising very deeply. Proper depth about $\frac{1}{4}$ inch. As a rule, pass no instrument for forty-eight hours, except at the time of operation. Then pass a sound at intervals, which should gradually increase, commencing at every other day. Always press its curve well down into site of incision. Internal urethrotomy is relatively best, and absolutely excellent in the penile portion of the urethra. Mortality, 10 in 1,192 (Teevan).

External Urethrotomy.—Suitable cases are those in which 'large, numerous, or obstinate perineal fistulæ coexist with old or obstinate strictures. When other treatment has failed, and the fistulæ refuse to heal, even although the patient has withdrawn for some weeks his urine entirely by catheter, no proceeding perhaps offers so good a chance of cure as this. It is for such cases I reserve it now.'¹ *Operation.*—Pass Syme's staff. Lithotomy position. Best light obtainable. Operator sits. Incise in line of raphè, 2 inches. Feel for staff with left forefinger. Take staff in left hand, and straight bistoury in right. With right hand supine, cut through stricture along groove of staff from behind forwards. Withdraw staff $\frac{1}{4}$ inch, and extend incision that distance further forwards. Shoulder of staff will now easily pass on through site of divided stricture, if the division has been thorough. Thompson passes a concave, curved director through the wound and towards the bladder, with the aid of which a catheter (not smaller than No. 10) is afterwards guided into the bladder. If catheter is obstructed in its passage, stricture requires more complete division, which should be done there and then. Morphia suppository. India-rubber tubing to catheter. Withdraw catheter after forty-eight hours. Pass No. 12 bougie at intervals, first of four days, then one week, then a fortnight, and so on. If any difficulty in passing this be experienced before wound heals, pass a grooved staff, and, with a tenotomy knife in the wound, divide the obstruction.

¹ Thompson on Stricture, p. 241.

Rules for Managing a Stricture impermeable to ordinary means.—It is assumed that there is no urgent retention. 1. Rest in bed without instrumental disturbance for three days or more. 2. Low diet, purgative, alkaline medicines, demulcent drinks. 3. Plenty of bed-clothing. 4. Opium, twenty drops of tincture. 5. Hot bath, 100°, rapid drying with towel—shortly before surgeon attempts to pass an instrument. 6. During catheterism, expose only the genital organs. Cover trunk and arms with blankets. 7. Give ether. 8. Commence with the very finest soft French bougie you possess. If you have not a filiform one, snip off the bulb of a fine 'bougie à boule.' 9. While an assistant is in the very act of injecting oil into the urethra, glide your bougie by the side of the nozzle of the syringe, down to, and if possible through, the stricture. 10. If that fails, try a catgut; but if there are false passages, pass a No. 6 gum-elastic down to the stricture, and glide your filiform bougie down by its side. 11. As a rule, a perfectly new filiform bougie answers best, but occasionally the surgeon finds an individual one of particular merit, which he treasures up and uses again and again. 12. As the orifice of the stricture is not always in the axis of the urethra, the instrument should be conducted carefully first along one side of that passage, then on the other, then along the roof, then along the floor. The soft instruments can only be used in this way when the stricture is very near the meatus. Deeper strictures, when eccentric in position, require the silver catheter. (Thompson's probe-pointed catheter should be employed.) 13. When an instrument has been passed at last, but with great difficulty, it should be left in a considerable time, say forty-eight hours, careful note being made of the particular manœuvre which proved successful. Instead of withdrawing it to make room for a larger size, a Wakley's tube can, with advantage, be passed over it. Wakley's tubes are of various sizes, and glide over the originally introduced catheter, which acts to them as a guide. 14. Whatever method is tried should have a fair trial. Fickleness is very likely to result in failure. 15. Make the patient urinate or break wind while you are trying to get the bougie through. 16. The attempts, if necessary, may be

renewed on a future day. Suppose, however, one of those rare cases of genuine impermeability. The stricture may be near the meatus. Of course there will be false passages. In such a case I saw Mr. Furneaux Jordan pass a very sharp, fine-pointed bistoury into the glans where the meatus ought to have been (the meatus was itself occluded, and the last quarter or half-inch of the urethra too), and fortunately or skilfully hit the urethra beyond. No trace of a meatus had remained, the surface of the glans being merely cicatricial tissue. If the impermeable stricture be in the penile part of the urethra, but not near the meatus, divide it subcutaneously—that is, pass a grooved director down to the stricture. Feel the size and position of the stricture with the finger and thumb, from the outside. Then, observing your landmarks carefully, and having the penis well and steadily held up on your director, pass a sharp tenotome through the skin opposite the end of the director. Next, without enlarging the skin-wound, and cutting always in the middle line, divide the stricture. When the tenotome has once reached the urethra on the vesical side of the stricture, the division can be accurately and thoroughly completed on a grooved staff. For genuine impermeable stricture in or near the bulbous part of the urethra, perineal section must be done, or the bladder may be punctured, after which catheterisation may be possible, owing to the relief which the stricture thus gets from pressure *à tergo*. For treatment of *Retention*, see URINE, RETENTION OF.

Perineal Section.—This operation resembles external urethrotomy, but differs from it in that the stricture, being impermeable, is not divided on a staff, but is carefully dissected through. The surgeon requires an excellent light. He should use all his knowledge of anatomy, constantly refer to the landmarks which are visible or palpable, and will do well to make the starting-point of his dissection the junction of the proximal part of the urethra with the stricture, a point which can be fixed by the end of a staff passed down to it. *Work throughout in the exact median plane of the body.* Protect the rectum. The details of this operation have been admirably worked out by Wheelhouse, of Leeds. He uses a staff with a small button

at the end. Urethra is opened in front of stricture, the opening then held up by the staff used as a hook, and the orifice of the stricture then searched for with a probe-pointed director. See *Brit. Med. Journ.*, June 24, 1876.

Accidents of Stricture are—Perineal abscess, perineal fistula, penile or ante-scrotal fistula, retention of urine, each of which is noticed in its alphabetical place.

False passage is a common effect of rough catheterism. *Treatment.*—If there is retention, the bladder may be reached sometimes by passing first one middle-sized instrument, then a fine catheter beside it. Otherwise, it is best to suspend attempts at passing instruments till the false passage has had time to heal. An instrument in a false passage moves freely, one in a stricture is gripped more or less tightly. Macleod, of Glasgow, recommends a course of quinine during the treatment of stricture. It is not unreasonable to think that it might act as a prophylactic against septicæmia. On the other hand, it appears to be powerless against urethral fever once developed.

DANGERS OF CATHETERISM.—The effects of catheterism on the *general* state may be classified under seven heads, each containing a particular set of cases. Of the seven, the first is clearly neurosal, the second is of uncertain nature, the third, fourth, and fifth are varieties of fever (commonly called ‘urinary fever’), the sixth is doubtless pyæmic, and to the seventh attention has lately been specially drawn by Sir Andrew Clark (Medical Society of London, Dec. 17, 1883).

(1) Immediately after a catheterisation (usually the first in the patient’s experience) he is attacked with nervous shivering, or he feels faint, or he falls down in a state of syncope, or even of epileptiform convulsions.

(2) Cases in which death supervenes in a very short time, varying from 9 to 48 hours. These Thompson attributes to shock, and Marcus Beck considers they are instances of uræmic fever, caused through urethral irritation or injury acting in a reflex manner on kidneys, usually diseased in such cases.

(3) Some hours after catheterism, commonly after the first micturition, a severe rigor, with rise of temperature, pains in

the back, &c., occurs. The patient gradually recovers, and in a day or two is all right.

(4) 'Acute recurring form' (Thompson). Several recurrences of attacks like the preceding. With care and attention recovery may be expected.

(5) Chronic urinary fever. Its insidiousness. Not necessarily severe rigors. A little chilliness. General malaise. Course of temperature not the same in all cases—sometimes low. Often a state which used to be described by the adjective 'typhoid.' This variety seems to be usually associated with long-standing, neglected, kidney and bladder disease. There can scarcely be a doubt but that antiseptic precautions of a suitable kind should be adopted in dealing with these, as indeed in the management of most other urinary troubles, especially as regards the instruments employed.

(6) Cases in which articular suppurations, probably pyæmic, follow urinary operations.

(7) Cases, the symptoms of which have not been differentiated from those of the fifth class, but in which no kidney or bladder disease has been found *post mortem*. Such have been described by Velpeau and Marx. See Sir A. Clark's paper (*op. cit.*) and the discussion thereon.

Local dangers of catheterism are haemorrhage, false passage, and even, as a sequence of the latter, extravasation of urine, abscess, &c. The last is rare in proportion to the commonness of false passages, probably because these lie in front of the stricture and are also valvular, opening forwards.

Urine.—Normal urine is clear, pale, amber-coloured, of specific gravity not greater than 1030, and acid in reaction. It does not respond to the tests either for albumen or for sugar, and it does not deposit urates as it cools. From thirty to fifty ounces are usually passed in the twenty-four hours.

The chief *urinary deposits* are—urates, phosphates, and oxalates, casts of the renal tubuli, mucus, and pus. Blood may be diffused in the urine, or even be passed *per urethram*, almost unmixed with urine. Grape sugar may be present in solution. Epithelium, bile-acids, bile-pigments, spermatozoa: certain constituents of the food may also be found, e.g. in the

strong-smelling urine passed after eating asparagus. The acidity of healthy urine is probably due to the presence of acid sodium phosphate. When a free acid is present, 'the reaction to test-paper is far stronger, and the liquid deposits on standing, little, red, hard crystals of uric acid ; but this is no longer a normal secretion' (Fownes's *Chemistry*, eleventh edition). Alkalinity of healthy urine very rare, and then due to neutral potash or soda salts of vegetable acids (e.g., tartrates, citrates, and acetates) taken into the stomach. Alkalinity in retention cases is due to fermentation, which forms ammonium carbonate from urea.¹

Urates usually red, but vary from pale yellow to purplish. Readily dissolved by heat.

Phosphates may be thrown down from neutral urine by boiling, but dissolve instantly when a drop of nitric acid is added. Contrast with albumen. Phosphates are most abundant in the alkaline, muco-purulent urine of chronic cystitis.

Oxalate of Lime is recognised, under the microscope, by its dumb-bell and octahedral crystals.

Renal Casts, found often in albuminous urine. Basis usually fibrin. May be waxy or fatty. May contain blood or pus-corpuses or epithelial cells.

Mucus may occasionally come from the prostatic urethra, and consequently be only accidentally mixed with the urine. Patient then generally passes it towards end of act of micturition. But mucus and pus, existing together, are usually accompanied also by phosphates and an alkaline reaction. Urine reacts also to tests for albumen.

Pus, unmixed with mucus, if diffused, is probably from kidney ; if not diffused, is from an abscess opening into bladder or urethra.

Blood in the urine may come from kidney, ureter, bladder, or urethra. Very unlikely to come from ureter, even in case of injury to abdomen. If renal, blood is diffused, producing 'smoky' urine ; if vesical, less likely to be entirely diffused, almost sure to pass partly pure ; if urethral, is likely to pass quite independently of urine, sometimes without micturition,

¹ In addition to what follows concerning urinary deposits, see CALCULUS.

sometimes immediately after micturition. Bloody urine is necessarily albuminous. Sham haematuria sometimes produced with colouring matters by impostors.

Grape Sugar increases specific gravity of urine, imparts a sweet odour, and increases flow of urine (diabetes). Trommer's test: add a few drops of solution of cupric sulphate to urine, then add excess of liq. potassæ, lastly boil: a red precipitate (cuprous oxide) is quickly thrown down. Pavy's test-pellets are handy.

Bile-pigment.—In cases of jaundice, sufficient bilirubin may exist in urine to answer to Gmelin's test. 'Treated with oxidising agents, such as nitric acid yellow with nitrous acid, it displays a succession of colours in order of the spectrum. The yellowish golden red becomes green, this a greenish blue, then blue, next violet, afterwards a dirty red, and finally a pale yellow' (Foster's *Physiology*).

Epithelium and *Spermatozoa*, as well as casts and crystals, are discovered by the microscope.

For the value of the above deposits, &c., see the sections treating on Diseases and Injuries of Bladder and Urethra, Abdominal Injuries, Impotence, Calculus.

URINE, EXTRAVASATION OF.—*Vide 'Extravasation of Urine.'*

URINE, RETENTION OF.—A term applied only to acute stoppage of the urethra, and never to mere habitual difficulty in urination.

Varieties.—(1) Retention from organic stricture, (2) from inflammation, (3) from spasm, (4) from internal obstruction, *e.g.* by calculus, (5) from external pressure, *e.g.* by abscess, (6) from enlarged prostate, (7) from hysteria, (8) from operations on pelvic or even on distant regions.

Causes.—Partly indicated in the last sentence. But the exciting cause of retention, whether purely spasmotic, or arising in the course of organic stricture, or of gonorrhœa (inflammatory retention), is usually drink or exposure to cold. Besides gonorrhœa, various drugs, *e.g.* cantharides, ergot, and even quinine, will sometimes temporarily close the urethra (by spasm or inflammatory effusion, or by both ?) The predominance of certain causes depends greatly on the age. In children the least rare are impaction of a calculus or a foreign body, a string tied

round penis, an injury to the perinæum, abscess, phimosis, and adherent prepuce. In adults the most common are alcohol and cold during organic stricture or gonorrhœa. Rarely, too strong urethral injections. In old age the chief cause is prostatic hypertrophy. *Symptoms*.—An adult in his senses would of course know if he could not pass his urine properly. But adults when delirious, or prostrate, or insensible, and children when young, may present no direct or striking sign of retention unless it be looked for. The bladder usually rises in the abdomen, making dull successively the hypogastric and even the umbilical regions. But, in old cases of stricture, the bladder may be organically so contracted that it would rupture before distending enough even to rise out of the pelvis. *Diagnosis*.—The most dangerous mistake is that of taking a case of retention with overflow for one of pure incontinence. Bladder-dulness usually, but not necessarily, considerable in retention. Some bladders are incapable of much distension; they will rather burst. Always catheterise if there be the slightest doubt. In *suppression of urine* the bladder is nearly or quite empty, and the symptoms belong rather to the kidneys and nervous system (*e.g.* lumbar pain and afterwards coma) than to the bladder and urethra. *Prognosis*.—If unrelieved, great danger of rupture of urethra, extravasation of urine, urinary abscess and fistula, or even gangrenous cellulitis and death. But this does not apply to hysterical retention; nature usually remedies that herself after a time. *Treatment*.—Hot bath (104°), liq. opii mxx ., then bed and warm blankets. Catheterise at once (except in hysterical cases). For spasmodic stricture use a No. 5 soft French catheter warmed by friction and well oiled. For organic stricture try the same instrument. If it does not pass at once adopt some of the measures detailed on pp. 437 and 440. If they fail to lead you to the bladder, and if his retention be complete or nearly so, the patient must not be left unrelieved. Aspiration above the pubes is perhaps the safest and best means of affording immediate relief. Other methods are (1) supra-pubic puncture with a small trocar and cannula, directed backwards and slightly downwards, (2) puncture per rectum, (3) opening the urethra

behind the stricture, (4) 'perineal section' proper, *i.e.* without a guide. If the surgeon never hopes to open the urethra satisfactorily again, he had better perhaps adopt plan 1. If he have confidence in his own skill, he is justified in attempting to cure both retention and stricture by plan 4, which he may, if he please, preface with plan 3 as an introductory procedure. (*See URETHRA, STRICTURE OF.*) In other cases his choice is practically confined to aspiration and puncturing per rectum. When retention is caused by impaction of a calculus or foreign body, the obstruction must be withdrawn if possible; but if it cannot be extracted per urethram, it may be pushed back into the bladder, and crushed by lithotrite, or extracted through a median perineal incision.

Uvula, Cleft.—Slightest grade of cleft palate. Pare edges and unite with fine sutures.

UVULA, RELAXED.—Usually part of a general condition of pharyngeal catarrh. Often causes troublesome cough. Astringent gargles. Touch with silver nitrate. Tonics. Stomachics. Attack cause, *e.g.* over-indulgence of any kind. Or seize the extremity with forceps and clip it off.

Vagina, FOREIGN BODIES IN, generally pessaries or sponges, may cause a false diagnosis of metritis, leucorrhœa, or even cancer, patient forgetting their presence. Sometimes they have to be removed piecemeal. Pessaries have for years remained unsuspected in the vagina, causing ulceration, foul discharge, &c.

VAGINA, INFANTILE TUMOURS OF.—Very rare. *See T. Holmes in his System, vol. v. p. 851.*

VAGINA, LACERATIONS OF.—Usually the result of parturition, occasionally caused by broken chamber-utensils, or by assaults, &c.; in rare instances, even by bridal intercourse. *Treatment.*—Trivial cases require only rest, silver nitrate, &c.; medium cases require sutures, and, if neglected at first, eventually operation for recto- or vesico-vaginal fistula. Severe cases may cause collapse and rapid death. Complete circular rupture of vagina, with expulsion of uterus, has been known during parturition. And this, also, without violent instrumental interference.

Vagina, Imperforate.—Usually a mere adhesion of opposite vaginal walls, easily torn open, and prevented from re-adhering by oiled cotton-wool. Not to be confounded with a very serious malformation, viz., *Imperforate Hymen*. This latter condition causes retention of the menstrual fluid till long after puberty. The *treatment* is to open by incision. Danger of resultant inflammation spreading to peritoneum. (Open with antiseptic precautions.) Vagina may be a *mere cul-de-sac, associated with arrested development of uterus and ovaries*. To diagnose the latter condition, examine (1) with catheter in bladder and finger in rectum ; (2) with speculum. Nothing can be done.

Absence of Vagina occurs in rare instances.

Vaginal Fistulæ.—(1) Vésico-vaginal, (2) urethro-vaginal, (3) recto-vaginal. *Causes.*—Laceration or sloughing, the result of difficult labour, or, more rarely, of accident. Syphilis. (Fistulæ from cancer are so irremediable as to be best not considered here.) *Symptoms.*—Incontinence of urine or of faeces. But the latter may not occur unless the rent is very large or the faeces fluid. Flatus may escape and little or no faeces. Seat and extent of fistula must always be determined by combined digital and specular examination. Catheter often useful. *Treatment.*—Purely operative. Cautery *may* be tried in very trivial cases. *Instruments.*—Duck-bill speculum, long straight and long angular knives, long forceps, tubular needles with Startin's handle, wire-twister, long curved scissors, long soft india-rubber catheter, silver wire, silk, handled sponges, &c. Chief points of operation are ten : (1) Health good, (2) rectum empty, (3) position—lithotomy, (4) nates held widely apart by assistant, (5) duck-bill speculum. Operator will occasionally hold this himself, but usually hand it to an assistant. (6) Drag the fistula towards the vaginal orifice. This may be done in various ways, *e.g.* with a blunt hook, or by one of the sutures. (7) *Thoroughly* pare the edges on the vaginal side, (8) but do not meddle with vesical mucous membrane, (9) sutures must not enter bladder, nor be pulled too tight. (10) Sutures should enter and leave about half an inch from edges of wound. As soon as operation is done, place, secure, and leave flexible

catheter in bladder. This should be cleansed twice daily. Patient now lies on her side. Unless untoward symptoms arise, leave sutures in ten days.

Operation for recto-vaginal fistula is precisely similar. Keep bowels confined for ten days. 'Whether or not the sphincter ani should be divided will depend upon the degree of tension which is present when the parts are brought together. It is not a slight measure, and should not be heedlessly resorted to.' (Hutchinson in Holmes's *System*.) Wash out vagina daily with a syphon. In operations about the vagina, remember the erectile tissue which lies immediately beneath the mucous membrane, and, therefore, remove the latter with delicacy, to avoid haemorrhage. Such haemorrhage may sometimes be controlled by hot-water injections (temp. 120°-130° Fahr.).

Iodoform dressings are specially adapted for operations, &c., on the vagina.

Trendelenburg has operated on very severe cases from the vesical aspect, doing a supra-pubic cystotomy and then raising the patient's pelvis and lowering her shoulders, &c., with the help of an attendant, who stands with his back to her and holds her thighs over his shoulders.—*Arch. f. klin. Chirurg.*, 1884, B. 31, H. 11. *Annals of Surgery*, July, 1885.

VAGINAL PROLAPSUS,

VAGINAL TUMOURS OF ADULTS, and

VAGINAL DISCHARGES, NON-GONORRHOEAL, are apt to be so intimately connected with uterine affections that they are most fully treated in gynaecological works.

NON-SPECIFIC VAGINITIS OF CHILDREN may cause evil suspicions; but the affection should always be presumed to be innocent, unless there is collateral evidence to the contrary, and Neisser's Gonococcus is found. *Cause*.—In some cases the passage of thread-worms from rectum to vagina, and local irritation. *Struma?* *Treatment*.—Local cleanliness, dryness, and mild astringents. Attend to general health.

Varicocele.—Sometimes no less than seven causes of varicocele are given! And all these exist in every healthy individual, old or young, yet varicocele is almost unknown in

young children and old people. Quite sufficient causes are to be found in the lax nature of the scrotum, and in the amount of violent congestion to which the spermatic veins are subject in many adolescents and young adults. The left side is oftenest affected. Several reasons have been given, *e.g.*, rectangular junction of left spermatic vein with renal, and relation of former vein to sigmoid flexure of colon. The left side of the scrotum is almost always larger than the right, and therefore laxer, as the left testicle is no larger than the right. The veins are enlarged, lengthened, and thickened. The enlarged veins coil around the cord and against the testicle in such a way as to feel 'like a bag of worms.' Increase on standing. Decrease on lying down. Impulse (slight) on coughing. Often aching pain and tenderness. Depression of spirits. *Treatment.*—I recommend the suspensory bandage which I have myself contrived. If properly fitted, it removes the venous congestion as soon as applied, and will often substitute for low spirits and aching pain a feeling of brightness and of being well braced up. In time it often effects a cure. Other local apparatus are Wormald's ring, the common suspensory bandage (generally inefficient), Morgan's (of Dublin) suspender; an inguinal truss (which is said to 'sustain' the column of blood above, though it manifestly must equally obstruct the flow of blood from below). Cold douching. Attention to the digestive system and bowels. Correction of evil habits. Operation is not to be too lightly undertaken. Under any circumstances, the after-treatment should be very careful, and every precaution taken against septic influences and to prevent embolism. Operation is justifiable when a patient finds it urgently desirable to pass into the public service without delay, or when a varicocele causes severe symptoms and will not yield to milder measures. Atrophy of the testicle said to be caused by varicocele. Many of the effects attributed to varicocele in certain cases are quite as much due to genital irritation of which the varicocele is itself a result. *Operations.*—Three kinds and many varieties.¹ Two subcutaneous; in one the veins are merely constricted, in the other they are constricted at two

¹ Refer to Royes Bell, *Lancet*, Jan. 28, 1882.

points and divided intermediately. In the third kind, portions of the vein are excised. The vas deferens (easily recognised by its cord-like feel) must be slipped well out of the way : the spermatic artery lies close to it. Ogston's operation will serve for an example. In it, the veins are tied in two places with aseptic silk. Scrotum disinfected beforehand. Silk applied subcutaneously by means of two punctures, the needle passing first behind and then in front of veins. Vas deferens to be carefully protected. Dressing of salicylic wool, renewed daily for three days. Bed for three weeks : then suspensory bandage. Gould recommends the galvanic cautery. I think no method is better than the following. Soap, shave, and wash well with carbolic lotion, 1-20. Incise the skin, &c., over the cord, not too near the tunica vaginalis. Having exposed the veins, separate them into several parcels, tie each with two ligatures of strong catgut, and cut off the intermediate portion. Provide for drainage. Dress with iodoform gauze, strapping, elastic and gauze bandages. To merely tie all the veins in one loop does not make a cure certain.

Varix.—Dilatation of veins. *Causes.*—Mechanical obstruction (e.g. varix of saphena from pressure of pregnant womb on external iliac vein). Occupations in which there is much standing, e.g. those of laundress and shopwoman. Such influences as the above act chiefly on persons with an individual or a family predisposition, and on certain localities, namely saphenous and spermatic veins, and their radicles. It is said that the deep veins of the legs are nearly as often affected as the superficial. Frequently the minute cutaneous venous radicles are alone affected. This often occurs in the face, and is frequently hereditary. *Pathology.*—Hypertrophy as well as dilatation of the venous coats, of the muscular as well as the fibrous elements. Dilatation sometimes regular, sometimes saccular. Extent varies from a small part of one vein to nearly all the veins of one or both lower extremities. As the valves do not grow proportionally, they soon become insufficient. Thickening of connective tissue round the veins. This may increase to general thickening of whole limb. *Œdema* from difficulty of circulation through the dilated veins with inefficient valves.

Œdema leads to eczema ; eczema to 'varicose' ulceration. Occasional bursting and haemorrhage. This may lead to ulceration. Coagulation in certain parts of the vein, generally near valves—'phlebolithes.' *Symptoms and diagnosis.*—When a varicose vein is surrounded by brawny tissue it may escape the sight : it can then be felt as a soft, subcutaneous 'channel.' Colour varies from flesh-colour to purple ; usually bluish-grey. Aching pain after long standing. Varix of spermatic vein may cause neuralgia and mental depression. (See *Varicocele*, above.) Varicose veins, when inflamed, become hot, tender, &c. *Prognosis.*—Easy to alleviate. Almost impossible to cure without operation, which is rarely justifiable (or entirely effectual when disease is extensive). *Treatment.*—Support by pressure of (1) elastic bandages, (2) elastic stockings, (3) common bandages—preferably starched, (4) strong lace-up stockings. Avoid standing or long sitting with legs dependent. Regular but moderate walking with legs well bandaged. Attend to bowels and general health. Iron. Horizontal rest in middle of day for an hour or two. Bathing in cold water after exercise. Elastic stockings should fit well. *Operations.*—A proceeding similar to one or other of those described above under the head of *Varicocele* is applied to as many parts of a varicose vein as may be required to obliterate it. Operation of excision of varicose vein with antiseptic precautions (spray, &c.) is much practised at Guy's Hospital by Howse and others. It is neatly described by H. P. Dunn in *St. Barth.'s Hosp. Rep.*, 1879.¹ Simple and safe as it is, it is yet only useful and justifiable in rare and exceptional cases.

Cases in which a single vein, *e.g.* the internal saphenous or several well-defined groups of veins are varicose, are specially adapted for operation. In order to excise the veins, the incisions over them need not exceed half an inch in length. Through each incision hook out a loop of vein with an aneurism-needle. A considerable length of vein may be extracted through each small opening, tied above and below with fine catgut, and the intervening piece cut out. The parts should

¹ See also *Guy's Hosp. Rep.*, 1874 (Davies-Colley), and 1877 (Howse).

be asepticised with liq. hydrarg. perchlor., dressed with iodoform gauze, and supported with an elastic bandage.

Veins, Air in.—This very serious accident occurs usually during operations on the neck or axilla, or (more rarely) cerebral sinuses. *Predisposing causes.*—Elevation of head or shoulders, deep inspirations, anatomical or diseased condition of tissues preventing collapse of wounded veins. *Pathology.*—The air distends and may paralyse the right heart or may obstruct the pulmonary arterioles. It is a physical fact that air and liquid together pass with difficulty through tubes which readily transmit either separately. *Symptoms.*—Sudden rushing or 'lapping' noise : instantaneous death, or else failure of pulse, pallor and convulsions, and, possibly, churning noise in cardiac region audible by auscultation. *Diagnosis.*—From the effects of the anaesthetic. The audible entry of the air and the nature of the operation usually make the case clear. As a rule the opened vein bleeds but little. *Prognosis.*—Depends on amount of air and on the force of its entry. Small quantities can, after an alarming struggle, be forced through the lungs by the right heart into the general circulation, where they do but little harm until they are absorbed. *Treatment.*¹—Prophylactic. In operating on neck, head, chest-walls, or axilla, keep those parts low and patient horizontal. If possible secure or control proximal parts of large veins before wounding them. Make large incisions, have good light, efficient retraction, thorough sponging, &c., so that you may *see* to avoid accidental wounds of veins. Be ready with (1) sponges, (2) douche, (3) aspirator, (4) aseptic soft catheter of large calibre.

If the accident occur, instantly press a sponge into the wound. When operating near the jugulars or axillary, tell off a smart assistant, whose sole duty is to watch with sponge in one hand, and jug of boiled (not boiling) water in the other. His instructions should be to act instantly on his own judgment.

The right ventricle can be safely aspirated through an

¹ For a good paper, with references to the literature, see N. Senn in *Annals of Surgery*, 1885.

aseptic needle passed between the fourth and fifth ribs, $1\frac{1}{2}$ inch from the margin of the sternum. The aspiration must be thorough and free. The catheter can be pushed on into the heart when the internal jugular is wounded, and the air and blood sucked through by the surgeon. Actual experience of these proceedings is confined to the lower animals. Electricity is useless.

In the less severe cases, I believe, position with the head downwards and artificial respiration to be useful. They must respectively lessen cerebral anaemia and help to pump the air-bubbles out of the heart through the pulmonary arterioles.

VENOUS THROMBOSIS.—Formation of a clot in a living vein.

Causes.—(1) Injury to a vein, *e.g.* a wound. This may act either by causing a roughness or projection into the calibre of the vein, or by obstructing the flow of blood altogether. (2) Constriction. This is probably the way in which inflammation external to the vein usually acts : the immediate effect is to slow the blood-current. (3) Dilatation, by retarding the flow of blood, will produce thrombosis, *e.g.* occasionally in varicose veins. (4) Another cause analogous in mode of action to the last two is constitutional debility, 'marasmic thrombosis.' (5) The entrance of an irritant or of septic poisoning into the blood. (6) Thrombosis in one vein may be merely the result of extension into it of a clot from a neighbouring vein ; *e.g.*, in certain cases of 'white leg,' obstruction of external iliac has spread up from uterine veins through internal iliac. (7) Gout.

Pathology.—When first formed, clot usually small, rarely large. Increases by laminar deposits. Usually fills the vein; rarely leaves a channel beside it, *i.e.* between it and the wall of the vein. Sometimes spiral in shape. Soon adheres to vein-wall. (In all above respects, it contrasts with post-mortem clots.) In time come (1) changes in the clot ; (2) changes in the vein itself ; (3) changes in the peri-venous tissues. To these may be added (4) changes in the parts formerly drained by the vein. The clot may either (1) disintegrate and pass into the circulation, or (2) organise into a fibrous band united with the vein, or (3) that part of it first formed may melt into a puriform

fluid, differing from true pus in containing granular *débris*, and not corpuscles. In this case the portion of clot last formed almost invariably remains to shut off the liquefied part from the circulation, or (4) the white corpuscles which wander into the clot may, instead of converting it into a fibrous mass (as in case 2), be the agents in forming true pus within the vein, or (5) a portion or the whole of the thrombus may be washed away, thus becoming an embolus. When suppuration occurs in the course of a thrombosis it must be understood that the pus is usually in the first instance *outside* the vein. The course taken by the vein, and its contained thrombus, is almost always identical with the changes taking place in the cellular tissue around the vein. *Diagnosis*.—See 'Phlebitis' (next page). But thrombosis may be recognised by the hard, cord-like feel of the vein affected, before inflammatory change has commenced, and by the oedema. *Prognosis*.—Varies most widely according to the extent and position of the clot, according to its first cause (e.g. whether the mere ligature of a vein, or the entrance of putrid fluid into it), and according to the course the case takes while under observation. The danger of embolism exists to a slight extent in almost every case, and of pyæmia in such as show a tendency to local suppurations or as arise in the course of wounds. *Treatment*.—See 'Phlebitis.'

Veins, Inflammation of.—A subject which in most surgical works is considered as if inseparable from Thrombosis. The separation is really difficult ; but the mixture generally plunges the cautious student into doubt and confusion as to what he is really reading about. Let it be premised that (1) inflammation of a vein is apt to lead to thrombosis in it, but does not necessarily do so ; (2) that it is sometimes impossible to diagnose whether a given case is phlebitis, with or phlebitis without thrombosis ; (3) that thrombosis is almost sure, unless quickly resolved, to lead to changes in the vein obstructed ; (4) that many cases called phlebitis are really cases of periphlebitis, *i.e.* of inflammation of the cellular tissue around the vein ; (5) that the concurrence of thrombosis is generally the most serious part of a case of phlebitis. Hence in treating any case of phlebitis or periphlebitis, the idea of thrombosis and of its possible

consequences—*e.g.*, solid œdema and pyæmia—never leaves the surgeon's mind.

PHLEBITIS.—*Causes.*—Injury, *e.g.*, phlebitis of saphena, following a dog-bite ; thrombosis or embolism, gout, septic infection, obscure influences, possibly presence of irritating materials in the blood. Varicose veins particularly liable. Paget, classifying phlebitis according to its causes, gives 8 kinds, viz. : (1) from injury ; (2) from exhaustion ; (3) from propinquity of inflamed or otherwise diseased parts ; (4) rheumatic ; (5) pyæmial ; (6) puerperal ; (7) gouty ; (8) from poisoning by foul drains. Some of these causes are qualified in the original lecture. *See* Paget's *Clinical Lectures*. *Symptoms.*—Redness, hard swelling, tenderness, more or less pain in the course of a vein or of part of a vein. Swelling sometimes knotty, knots said to correspond to seat of valves. œdema in parts whence the vein should drain blood. Sometimes visible enlargement of collateral veins. If suppuration occurs, there is local softening and general rise of temperature. Perhaps a rigor. *Diagnosis* has chiefly to be made from lymphangitis. It depends on the situation of the redness, &c., and on the width of the band of inflammation (greater in phlebitis). Glands also more likely to be enlarged in lymphangitis. *Pathology.*—Inflammation of the vein itself is almost always preceded by thrombosis ; and, when not preceded by thrombosis, it is probably secondary to periphlebitis. The experiments of modern pathologists, *e.g.* Lee and Callender, certainly prove that the older pathologists were accustomed to mistake mere thrombosis for an exudation of lymph from the wall of the vessel ; but, to my mind, considering the anatomy of the veins, and arguing analogically, they are not numerous and severe enough to prove that exudation of lymph never takes place ; and they most assuredly do not justify the dismissal of true phlebitis from our nosology. But any thickening of the outer or of the middle coats, or roughness of the inner coat of an inflamed vein, is so rarely found, independently of thrombosis, and is, in itself, of such small importance, that the most interesting pathological features associated with phlebitis must be sought for under the head of venous *thrombosis*. *Prognosis.*—*Vide* 'Venous Thrombosis.'

Treatment.—Rest. Elevation, gentle and even pressure. If a common roller be used, place a layer of cotton-wool beneath for the sake of elasticity. Regulate bowels. Moderate or low diet. If abscess threatens, it may be poulticed, fomented with hot water, and opened early. Extensive cases of solid oedema from venous obstruction are rarely entirely cured, some thickening remaining. As ammonia readily enters the blood, and, when there, retards coagulation, there is a rational indication for giving it in cases of phlebitis. I believe Dr. Richardson has demonstrated its value in cases of thrombosis. The carbonate in large doses would be the best form to administer. When vein affected is large, rest should continue a month from date of last marked attack of pain, to lessen risk of embolism.

Concerning *gouty phlebitis*, Paget says it is 'either associated with ordinary gouty inflammation in the foot or joints, or occurs, with little or no evident provocation, in persons of marked gouty constitution or with gouty inheritance. Not rarely it has peculiar marks, especially in its symmetry, apparent metastases, and frequent recurrences.' *Treatment.*—Employ same means as in managing gout affecting other external parts, especially rest and elevation.

Veins, Injuries of. *See 'Wounds,' 'Hæmorrhage,' 'Venous Thrombosis,' 'Veins, Air in,' &c.*—Wounds in large veins can be almost always safely closed by either ligature, suture, or compression with iodoform gauze tampon. On the question whether, when the main vein of a limb is suddenly occluded, the artery should not be tied also, *see* L. S. Pilcher, *Annals of Surgery*, 1886, vol. i. I should, myself, be inclined in the case of the lower limb to prefer elevation and pressure, at all events for a time. With regard to the upper limb, ligature of the axillary artery is comparatively safe.

Vesico-vaginal Fistulæ. *See VAGINAL FISTULÆ.*

Warts. *See Papillomata (under head of TUMOURS).*

Whitlow.—Erysipelatous inflammation of finger. Varies in extent from trivial but painful blush beside nail, to diffuse suppuration spreading up forearm and destroying tendons, phalanges, and even wrist-joint.

Mr. Christopher Heath classifies whitlow into four varieties, viz. :—

- (1) Mere erythema.
- (2) 'The superficial whitlow,' usually about the nail.
- (3) Acute necrosis of the terminal phalanx.
- (4) Inflammation of the skin and subcutaneous tissues in any part of the fingers, which may lead to true thecal abscess or to necrosis of any of the phalanges.

Causes.—Local punctures, cuts, and scratches, poisonous or otherwise. Predisposing causes are same as those of erysipelas, *quod vide*—e.g., low state of health, diseased kidneys, epidemic and endemic influences. *Pathology.*—A cellulitis, at first, usually, of cellular tissue around ungual phalanx, but tending to spread to sheaths of tendons, to skin and subcutaneous tissues of back of hand, and even, as above stated, to phalangeal, and in the worst cases to metacarpal and still larger joints. May subside. Usually suppurates. Local and general effects precisely similar to those of cellulitis elsewhere. If a phalangeal joint be affected, or a tendon slough, there will probably be a stiff and contracted finger afterwards. *Symptoms.*—Local redness, heat, throbbing, pain, tenderness, and swelling. Feverishness in slight cases, prostration in severe ones. Increased swelling and œdema when pus has formed. As incision is generally made early, and as the part is exquisitely tender, fluctuation need not necessarily be felt for. *Diagnosis.*—Effects of a foreign body in the finger or hand may be mistaken for a simple whitlow. *Prognosis.*—Usually good as regards life, even in extensive cases extending up forearm. Bad or good locally according to extent to which tendons and joints are affected. *Treatment.*—Rest, local and general. Elevation and flexion; carry hand in sling just beneath chin. Pressure on brachial artery: patient can be taught to make it with the thumb of his sound hand. Poultices: frequent hot fomentations. After forty-eight hours, if symptoms are unrelieved, make two longitudinal incisions; one on each side of palmar surface of finger (of course, excepting those slight cases where this part remains unaffected).

Give a purgative, e.g., calomel gr. x., afterwards iron (tinct.

ferri perchlor. m^{xv}. ter d. s.). Regulate diet according to patient's condition and constitution. As a rule, avoid meat. Appetite is generally bad. Phalanges may have to be excised or fingers amputated, in consequence of ill-effects of old whitlow. During convalescence, if contraction threatens, place finger on a splint. Stiffness of hand may persist for a ~~very~~ long time, and be eventually removed by passive exercise, frictions, &c. Be careful not to open tendon-sheath unless it contain pus. Then use antiseptic methods.

Wounds.—*Classification.*—(1) Incised, (2) lacerated, (3) contused, (4) punctured, (5) poisoned. Wounds are also either open or 'subcutaneous.' 1. *Simple incised.*—Its characters are clean edges, freedom from bruise or laceration and from poisonous matters, at least when first inflicted. 2. *Lacerated.*—its edges are usually irregular, and frequently more or less contused. Comparatively small tendency to bleed. 3. *Contused.*—Has bruised edges; is usually also 'lacerated.' 4. *Punctured.*—*E.g.*, a bayonet stab, generally narrow and deep. When caused by gunshot, its walls are bruised. 5. *Poisoned* wounds are such as snake-bites and dissection-wounds. In *subcutaneous* wounds the aperture in the skin is small compared to the incision beneath it, *e.g.* in 'tenotomy.'

Pathology.—*Process of repair, &c.* (compare with INFLAMMATION, *quod vide*).—When a simple incised wound is inflicted, Nature first checks haemorrhage by closing the ends of the divided vessels in the manner described under HÆMORRHAGE, *i.e.* by coagulation and contraction. At the same time there is usually a thin clot formed between the two surfaces of the wound. In consequence of the blood being unable to find its way through the divided vessels, there is congestion of the vessels about the wound; and the congestion of the neighbouring parts, caused by the blood pressing through the nearest uninjured channels, is called 'collateral fluxion.' In this way is produced the narrow line of redness around a fresh wound. The course of events after this is determined by whether the wound is to heal by the first intention (primary union), or by granulation. *First intention.*—There is a great accumulation of white corpuscles, both inside and outside the blood-vessels

near the wound. These leucocytes permeate the clot, if there be one, cause its liquefaction and absorption, and take its place. At the same time the edges of the wound are themselves to some extent dissolved and replaced in the same manner. The leucocytes pass gradually through an oval into a spindle shape. These spindle-cells form, partly of themselves and partly of the intercellular liquid substance in which they lie, fibres of connective tissue, thus tying the two sides of the wound together. At the same time new capillaries are formed, which bridge across the wound, allow blood once more to flow in its old course, and thus relieve the collateral fluxion. At this stage the scar grows redder, and its surrounding edges paler. The new capillaries are developed in two ways : (1) by loops which grow out from the vessels divided by the wound ; (2) by certain rows of spindle-cells which develop into capillaries. Professor Hamilton, of Aberdeen, describes a third way. He says that the capillaries of granulation-tissue are loops pushed into them out of the subjacent parts by the force of blood-pressure.¹ At a later stage the new fibrous 'cicatricial' tissue contracts, becomes 'drier,' *i.e.* less succulent, and, in contracting, obliterates many of the new capillaries. The cicatrix becomes, therefore, smaller and paler. Of course, after healing by the first intention, it is merely linear at first ; but in a short time it may defy detection altogether. So rapidly does this disappearance take place in some cases that pathologists have described what they call 'immediate union' or 'primary adhesion,' meaning presumably, a perfectly simple cohesion like that of one piece of melted sealing-wax with another, and without further interstitial changes. *Granulation.*—The process of healing when raw surfaces cannot be brought into apposition, and unfortunately also in some cases where they can. The microscopic anatomy of this process differs from that of 'primary union,' in that (1) the accumulation of leucocytes forms, on the surfaces of the wound, small elevations called granulations ; (2) more or less of the waste tissues and superfluous corpuscles, which would be absorbed or profitably used in healing by the first intention

¹ On Sponge-grafting see *Ed. Med. Journ.*, Nov. 1882.

are, in the case of healing by granulation, cast off as discharge ; (3) the new capillaries cannot extend from one edge of the wound to the other, because they are too much separated either by distance or by some other obstruction, *e.g.* a foreign body or excessive clot ; (4) a much larger production of epidermis is required to cover the surface of the wound. The resulting scar is larger, coarser, and much more prone to mischievous contraction. The new epidermis is developed from the most superficial layer of corpuscles in the granulations ; but it appears concentrically from the epidermis at the edge of the wound, or else spreads from islets of old epidermis left by nature or placed by art on the area of the wound. (*See SKIN-GRAFTING.*) Pus-corpuscles are identical with leucocytes, but usually contain several nuclei, indicating a tendency to multiply by division.

Connective tissue, epidermis, epithelium, bone, and even nerve are reproduced perfectly (the last only to a limited extent). Muscles are only repaired by development of connective tissue.

Lacerated, and even contused wounds usually fail to heal by the first intention. The latter, especially, are liable to slough at the edges, and both tend to suppurate freely. Much depends on the conditions of each case, *e.g.*, on situation of wound, on state of patient's viscera, and on treatment. Punctured wounds usually heal by first intention, except when also contused, as they are in gunshot wounds.

Five methods of healing have been recognised, viz., (1) primary adhesion ; (2) first intention (or primary union) ; (3) granulation (or second intention) ; (4) union of two opposed surfaces, each covered with granulations (third intention) ; (5) scabbing. Method 4 combines, in succession, the processes of 3 and 2 ; 5 is probably similar to 3 ; only such waste-products as there are dry up into a scab, being of very small amount.

Healing by Organisation of Clot is exactly similar in nature to healing by the first intention, in which, indeed, a thin clot generally does exist and becomes organised. A curious phenomenon is that, if any clot project beyond the level of the

general surface, the new epidermis cuts off the projecting part, healing only over the remainder. If any cellular tissue project beyond the edges of the wound, healing is delayed a week or more. Organisation of clot is beautifully seen after antiseptic osteotomy, and is well described by Macewen in his book on that subject. Lister rightly holds that the frequency of this process under antiseptic treatment is a strong proof of the soundness of his doctrines.

Immediate consequences of a wound are (1) pain, (2) haemorrhage, (3) displacement, (4) loss of function, (5) shock. Pain of dividing skin, tense fascia, and bone comparatively great. *See Hæmorrhage* for separate notice. Wounds by laceration, crushing, and cauterisation usually cause little, often no haemorrhage. Displacement is usually a consequence of retraction. Not only muscles, but mere fibrous structures retract, by virtue of their elastic constituents. Loss of function varies in extent from stiffness, the result of tenderness, up to death. *See* separate notice for SHOCK. Retraction is greatest in the direction of the length of a limb, and in the muscles as compared with the skin, &c. Amount of pain varies with character, and even with occupation of patient. Of course, loss of function and displacement may amount to permanent paralysis and deformities. It is when the surgeon is about to inflict wounds (*i.e.* operate) that he has most to consider the above-mentioned 'consequences.' In treating accidental wounds, the 'consequences' are generally only too manifest.

Prognosis depends on (1) locality, (2) extent, (3) health of patient, especially state of kidneys and lungs, (4) age, (5) habits, (6) surroundings, (7) character, *i.e.* whether incised or lacerated or poisoned or otherwise, (8) treatment. There are also other conditions less generally active, *e.g.* race, which also may be secondary to such influences as habits. That wiry countrymen are more hopeful subjects than fat, flabby townsmen, is an example of the action of 'habit' and 'health.' Wounds of the upper do better than those of the lower extremity, especially as age advances. Generally youth is a great advantage; but infants bear haemorrhage badly. There is no

more unfavourable habit than habitual drinking. In so far as the above-mentioned influences act by making the patient ill able to resist septic infection, antiseptic measures tend to obviate them.

Treatment.—Indications are—(1) to check haemorrhage, (2) to remove shock, if very severe, (3) to remove foreign bodies, to cleanse and asepticise, (4) to adjust, (5) to dress, (6) splints, position, &c. 1 and 2 *vide HÆMORRHAGE and SHOCK.* 3. Use of hot water, cold water, antiseptic lotions, sponges, camel's-hair brushes, forceps, fingers, &c., according to peculiarities of each case. Gentleness is imperatively required. 4. In adjusting, avoid tension. Arrangement of joints, &c., so as to relax parts divided : *e.g.*, after accidental division of tendo Achillis, foot should be extended and leg flexed. 5. Dressings : Prime objects are, first, to keep the divided parts in proper position ; secondly, to prevent local and general complications which may interfere with healing and even endanger life. First object is fulfilled by use of sutures, strapping, pads, splints, and position ; of course all this array of means is not used in every case. Second object requires precautions to be taken against (1) exposure to draughts of cold air, (2) painful movements and positions, (3) septic influences. Changes of dressing should be quickly effected, and windows and doors closed during the process. Pain is prevented by careful adjustment of dressing, of splints, of position (especially by elevation and flexion), by use of swing-cradles, of cushions, &c. Opiates sometimes desirable, especially morphia subcutaneously.

Drainage is a necessity for almost all wounds where there is likelihood of suppuration or serous discharge. Effected by drainage-tubes of rubber (Chassaignac), of decalcified bone (Neuber), by strands of catgut (Chiene) or horsehair (White), or by strips of gutta-percha.¹ Desirable to consider how to favour drainage in arranging direction of cuts and position of wound. A drainage-tube is a foreign body which may itself cause pain and irritation. As a rule, after the first three or four days, unless it be absorbable, it should be removed,

¹ In *Brit. Med. Journ.*, Feb. 5, 1881, is a very practical paper by Macewen. In it is described the mode of preparing chicken-bone drainage-tubes.

squeezed, and washed at every dressing. Manipulate drainage-tubes very gently.

Septic influences: their avoidance can be thoroughly secured in only one way, viz., by preventing the access of living germs to the wound. But much good may be done by removing, as fast as they collect, all discharges which can form a nidus for these germs. The former end is most surely secured by the antiseptic system rigorously applied.¹ The latter aim can be more or less successfully attained by several means. As no antiseptic system can provide against all the dangers of wounds, it is not surprising that a surgeon, after losing a case or two, dressed with thorough antiseptic precaution, should be disposed to return to more familiar methods, upon which, in past times, his fortune may have smiled more favourably. Although 'open treatment' and oakum dressings are unable to hold their own when pitted against stricter and more scientific methods, they have done good service and deserve respectful consideration. They doubtless both act by gaining the second end above mentioned, viz., the removal of discharge from the wound as fast as it forms, and, consequently, by depriving the septic germs of material to work upon. Oakum dressings have these superiorities over open treatment: they protect the wound from cold draughts, they destroy offensive smells, keep the general air of the ward pure, and *actively* drain the wound by their power of capillary attraction. But the antisepticity of oakum is not quite reliable. What I saw when house-surgeon under Gamgee at Birmingham convinced me that no system of wound-dressing could be complete without some provision for gentle and elastic compression. This Gamgee used to secure with cotton-wool; but as soon as Martin's bandages became known in England I took to completely covering with them the antiseptic dressings of my operation wounds. The mode of dressing used lately by Esmarch with a success perhaps unparalleled, not only as regards general results, but as regards individual cases, may be described as an instance of the successful combination of antisepticism with gentle compression. Next the wound are placed pads soaked in iodoform

¹ See ANTISEPTIC TREATMENT, p. 28.

and absolute alcohol (ten per cent.), then an iodoformed bandage, then a large pillow of jute and gauze, then a moist bandage, and lastly an elastic compress. Healing takes place by the first intention, not even a hole for the drainage-tube being left ; for absorbable tubes of decalcified bone are used. It is important before applying such dressings to check all oozing of blood. Recurrent haemorrhage need scarcely be feared at all. In cases where it is expected, sponge-pressure should be used. The under-bandages should be put on as lightly as possible, and the elastic bandage should be applied with great care and gentleness. Place one gauze bandage over the elastic bandage. The use of the elastic bandage, as I am now advocating it, is, of course, something more than its employment merely to keep the *edges* of the dressings snug. Iodoform, insufflated, makes a capital dressing for many wounds, *e.g.* lithotomy, perineal section, operations near the mouth, anus, urethra, and the like. Wound-cavities in these neighbourhoods may be stuffed with iodoformed gauze. Other modes of local treatment, comparatively rarely employed, are cotton-wool dressing, irrigation, and immersion. Poultices of linseed, or of bread, are still in common use, and are certainly soft, moist, hot, and comfortable, and can thus act favourably on local inflammations that may be near the wound. Oakum (including the kinds termed 'tenax,' 'stipium,' &c.) is applied like a poultice. Like almost every other antiseptic substance, it is somewhat irritating ; therefore a narrow strip of protective should be placed next the edges of the wound. The not uncommon practice of using lint soaked in carbolised oil as a protective is unreasonable ; for the lint obstructs the absorptive power of the oakum, the carbolic acid is as irritating as the tar in the oakum, and the oil greatly obstructs the germicide power of the carbolic acid (Koch). Rarely should the wound, excepting when fresh, be syringed or washed—it cannot be kept too dry. According to Naegelé, bacteria are unable to develop in concentrated organic solutions. Hence value of dry dressings. Moreover, as Lister says, aesthetically clean, water dressing is surgically dirty, because it contains elements which give rise to septic changes in wounds. Gamgee on the

'Treatment of Wounds' is an authority on oakum and cotton-wool dressings, but unjust to Lister and his methods. Without antiseptic treatment, grand statistical results have been obtained by various surgeons; but, considering how many things affect the success of surgical practice—*e.g.*, experience, observation, judgment, resource, manual dexterity, pluck, patience, enthusiasm, and, above all, endemic and epidemic influences—it is certain that *mere* statistics prove little for or against any system of dressing wounds, unless those statistics extend over long periods of time, different localities, and immense numbers of cases. And even then they should not be permitted to overrule other evidence such as presents itself to the surgeon who, in London at all events, watches any small series of wounds in detail, of which some are treated antiseptically and others not. For even the statistics of an honest observer have not really the force of mathematical certainty. Behind them is always the human heart, whose truth, though often noble, is never mathematical.

These remarks are not uncalled for. Repeatedly, of late, have the student and practitioner been invited to deprive themselves and their patients of the safeguards offered by modern science, on the strength of a comparison between the statistics of *two places only*. Such a comparison no more furnishes an argument against Listerism than the security of those Arcadian farmers who had 'neither locks to their door nor bars to their windows' condemns the use of the Metropolitan Police.

Much has been talked about certain statistics by the anti-Listerians. A careful study of such as they have furnished is calculated to tell against their own views. Take, *e.g.*, the following table from *St. Barth.'s Hosp. Reports*, 1882, p. 383, Table II.:—

	Operations	Died	Percentage
Esmarch (1st period) : . . .	524	25	4·4
Esmarch (2nd period) : . . .	898	6	1·2
Lister at Edinburgh : . . .	725	39	5·1
St. Bartholomew's (1876-78) : .	1,235	72	5·82
Kilmarnock (12 years) : . . .	278	12	4·1

There is a foot-note concerning Esmarch. It states that in the first period he used Listerism, and in the second, 'lint soaked in abso-

lute alcohol and iodoform bandages.' This imperfect description of Esmarch's dressing scarcely indicates, what is the case however, that his system is really modified Listerism, and avowedly based on Listerian principles. At St. Bartholomew's a great deal of the surgery is strictly Listerian, and much of the remainder more or less antiseptic. With regard to Kilmarnock, it is to be noted that the statistics of that place are the boasted champion non-antiseptic statistics. Why should the inventor of a new system be expected to beat all comers? Is it right to assume that his own results must be the best obtainable from the process?

During the time that I was only assistant-surgeon to the West London Hospital I had but 69 operations in the theatre of the hospital—of them 11 died, 9 of them probably from septic causes. In August, 1881, I began to act as full surgeon. In the year following, proper means of carrying out antiseptic surgery having now been supplied, I had 75 operations and not one death. From August, 1881, up to November, 1885, I had 438 operations and 16 deaths in hospital. The mortality rate was, therefore,

in the first period	11	in	69 = 16 per cent.
„ second (antiseptic) period	16	in	438 = 3·6 per cent.

But, as Volkmann says of amputated limbs, it is no use counting them like fallen apples. It is necessary to go into details to get at the value of statistics. For these see the *Medical Press* for Feb. 24, 1886. I will only mention here that in the 438 cases were 235 operations on the larger bones and joints, including 22 major amputations, all but 4 through the lower extremity. Of these 235 only 1 case died, a double amputation (one thigh and the other leg) for railway smash.

A few examples of statistics may be given, which should, collectively, carry weight.

(1) Lister, Glasgow Royal Infirmary (*Lancet*, p. 40, vol. i. 1870):—

Two years before antiseptic period, 35 major amputations, 16 deaths;
Three years after antiseptic period, 40 major amputations, 6 deaths;

a change from 46 per cent. to 15 per cent.

(2) Macewen, Glasgow Royal Infirmary, comparison of the work of two different surgeons with each other:—

1875.	Aseptic	3·29 per cent. deaths.
	Non-aseptic	7·63 " "
1876.	Aseptic	3·28 " "
	Non-aseptic	6·91 " "
1877.	Aseptic	3·68 " "
	Non-aseptic	5·13 " "
1878.	Aseptic	2·98 " "
	Non-aseptic	3·96 " "

These calculations are made from very large data.

(3) Lister, Edinburgh Royal Infirmary:—

558 aseptic cases = .36 per cent. deaths from blood-poisoning.
 292 otherwise = 1.86 " "

In Cheyne's *Antiseptic Surgery*, pp. 378-384, is a powerful comparison, in detail, of Lister's results with Spence's—same hospital, same period.

(4) Volkmann (*Intern. Med. Cong. 1881*):—'Two examples will suffice, compound fractures and major amputations. The mortality after compound fractures had, during the long labours of my predecessor as well as during my own, reached the sad height of 40 per cent. When I adopted the antiseptic treatment of wounds my last twelve patients, with compound fracture of the leg, had all died of pyæmia or septicæmia. From that time up to the present day I have treated one after another 135 compound fractures, and not a single patient has succumbed to either of those accidental wound diseases; 133 were cured, two died—one of fat-embolism of the lungs, during the first few hours; and one, a drunkard, of delirium tremens.

'For amputations one assertion will almost suffice, which I beg you to regard seriously: I now cure every year more cases of amputation of the thigh than during all the rest of my labours before the introduction of the antiseptic method.'

(5) Nussbaum bears similar testimony.

(6) Saxtorph, of Copenhagen ('Cheyne,' p. 395), excisions (major):—

	Operations	Deaths	Percentage
Period 1, non-antiseptic	15	9	60
, 2, imperfect antiseptic	76	32	42
, 3, efficient	34	5	15
, 4, absolutely strict	24	1	4.3

Ollier and Stokes have had a similar experience (*see EXCISIONS* in this book).

(7) Esmarch's totals are given above. The rough details are noticeable.

	Operations	Deaths
(1) Exirpations of large tumours, including 40 amputations of the breast, with clearing out of the axilla, and 14 castrations	146	3
(2) Amputations, viz., 18 of thigh, 27 of leg, 5 of upper arm, 1 of forearm	51	2
(3) Resections—20 of knee, 8 of ankle, 7 of shoulder, 14 of elbow, 3 of wrist, 5 of ribs, 1 of sternum, 2 of calcaneum, 1 of patella	61	0
(4) Disarticulations—3 at hip-joint, 5 at ankle, 1 at shoulder, 1 at knee	10	1
(5) Removals of sequestra, scooping out of carious bones, abscesses, and fungoid growths	26	0

	Operations	Deaths
(6) Nerve-stretching	18	1 (for tetanus)
(7) Herniotomy	8	0
(8) 'Cold abscesses' opened and cleared out	21	0
(9) Considerable wounds, and lacerations of the soft parts	12	0
(10) Complicated fractures and other large operation wounds	49	0
Total	897	7

(8) Spencer Wells (*Intern. Med. Cong.*), his last 168 ovariotomies (up to date of paper):—

	Operations	Deaths
Non-antiseptic	84	21
Antiseptic	84	6

(9) Macewen (*Intern. Med. Cong.*) 330 patients, 557 limbs, 835 osteotomies, *i.e.*, deliberately produced compound fractures; 3 deaths (all from causes independent of the operations). Only 8 of the wounds suppurated.

(10) Space fails, or many other eminent surgeons might be quoted, *e.g.*, Czerny, Lucas-Championnière, Létiévant, Gross (of Nancy), Boeckel, Reyher, Hueter, V. Bruns, Socin, Schede, Kocher, &c. I feel, however, constrained not to omit the statistics of Billroth's amputations given by Wölfle.¹ Billroth is of Volkmann's opinion that amputation statistics should be classified into 'non-complicated' and 'complicated' cases. The latter class is composed of all the cases which either before or after the amputation are complicated with dangerous affections having no direct connection with the course of the wound. Take, for example, a case of acute tetanus in which amputation is performed.

Billroth's non-complicated major amputations:—

	Treatment	Mortality
Zurich, 1860-67	open	35.1 per cent.
Vienna, 1868-75	open	29.5
Vienna, 1875-76, phenol and thymol dressings	‘antiseptic’	5.7
Vienna, 1877-80		„

Billroth's non-complicated major amputations done for inflammations of the bones and joints:—

	Operations	Deaths
1871-1876	58	16
1877-1880	56	0

Of the 16, 11 died of pyæmia, 4 of exhaustion, 1 of erysipelas.

Billroth's complicated major amputations:—

Operations	Deaths
17	10

Now, what do those English and American surgeons who proclaim the Kilmarnock and Lawson Tait statistics from the house-tops wish to

¹ 'Die Amputationen' in Prof. Billroth's *Klinik*, 1877-80, Vienna, 1882.

prove? Do they teach that, by avoiding Listerism, they can bring their cases of the 'complicated' class, namely, such as those in which pyæmia exists or tubercular meningitis supervenes, to a successful issue? That would surely be asking reasonable men to believe too much. Or do they think their arrays of semi-classified figures, one from a small new hospital in a little town, the other from a narrow special field of practice, will upset the germ theory of putrefaction, a theory which has been proved to demonstration, or even the germ theory of the origin of the traumatic infectious diseases, which is all but conclusively proved also, and which, moreover, is not the foundation of Listerism, but only a buttress.

When surgeons still carp at Listerism, let them ask themselves what it is: what is the simplest formula which will express what Lister has done for us.

His thoughts were directed to the theory of putrefaction, the proofs of which were up to that time mainly due to Schwann, Schroeder, and Pasteur, namely, that theory which attributed it to the influence of minute vegetable organisms. He saw the bearing of this on the question of the cause, prevention, and cure of the accidental complications of wounds. From that day to this he has devoted a life of ingenuity and patience to his idea, which was the invention and perfection of a scientific and workmanlike system of keeping noxious living organisms out of wounds altogether. The execution of this idea was his, his alone, and absolutely no other man's, and only one other had any claim to have approached even the conception of it.¹

Well, now, how does it stand with this idea? The theory upon which it rests is, I repeat, proved absolutely. No mountain stands more securely on its adamantine base.

With regard to the Listerian practice and its results in the hands of perhaps a majority of the ablest surgeons in Europe, the above-quoted statistics may be pointed to as an indication; and every surgeon who carries it out thoroughly sees, every day in his own wards, proof upon proof accumulate.

Antiseptic or aseptic surgery is the essential instrument of the surgery of the future.

¹ Lemaire anticipated Lister in the belief that decomposition in wounds was due to the influence of organisms; and though he was not the first to use carbolic acid lotions, he was the first to use them with the clear intention of destroying the organisms, with an intention identical with that which actuates us now when we syringe out a compound fracture with '1-20.'

He thus explained the *rationale* of much that had been done by surgeons years before his time, but he never devised anything deserving the name of system. He, however, tried to do so, and therefore I think he fairly deserves to be counted as a link between the old and the new. It is impossible to help feeling sympathy with this man, who held, as it were, immortality within his grasp and—let it go!—was constrained perhaps to let it go by force of circumstances, for it is noticeable he held no hospital appointment. The times were ripe, however, and the future could not continue to hide the secret, which had long, as Volkmann says, been floating in the air.

Very rarely do any severe wounds, of the soft parts alone, require *amputation*. But they may do so when (1) even recovery would only be with so much deformity or loss of function that the part would be worse than useless ; or (2) when the injury is so extensive and serious that gangrene and death are threatened. Injuries complicated with division of large arteries, with much contusion, and in the lower extremities of adult, and much more of aged, people, are of this nature. It is sometimes safe enough to wait and watch in doubtful cases, ultimately saving the limb or doing secondary amputation, according to the course of events. Never lose sight of antiseptic principles while managing such cases, and especially remember the contrasted prognosis of 'complicated' and 'non-complicated' amputations (see p. 470). No verbal rules can do instead of experience in deciding in such cases. Here even the master surgeon steers with perplexity between Scylla and Charybdis.

THE SPECIAL SURGERY OF THE FEMALE INTERNAL GENERATIVE ORGANS.

BY

ALBAN DORAN, F.R.C.S,

ASSISTANT-SURGEON TO THE SAMARITAN HOSPITAL.

Ovaries.—Chief affections: inflammation, acute and chronic; cystic disease; solid tumours.

OVARY, ACUTE INFLAMMATION OF.—*Causes.*—Puerperal complications, gonorrhœa, sexual excesses, exposure to cold, acute rheumatism, scarlatina, &c. *Symptoms.*—Severe pains in one or both iliac fossæ, radiating to loins. By pressing the left hand on the iliac fossa, and introducing two fingers of the right hand into the vagina, pushing upwards, the ovary may be felt between the right- and left-hand fingers—it will be distinctly swollen, and very tender. *Treatment.*—Absolute rest, Opium. Leeches and poulticing to iliac fossa.

OVARY, CHRONIC INFLAMMATION OF.—Very insidious, and often begins gradually; not always preceded by acute symptoms, may end in cirrhotic changes; and is sometimes associated with persistent dysmenorrhœa so intolerable that both ovaries, when thus affected, have been of late years frequently removed, without always relieving the symptoms. Fixed pain in iliac fossæ, and detection of swollen ovary the chief signs of the disease; local, general, and psychical complications infinite. *Treatment.*—Blisters, rest during period; observe closely the condition of surrounding viscera, and treat accordingly.

OVARY, CYSTIC DISEASE OF.—Pathology not yet absolutely settled. Cysts that are evidently developed from simple enlargement and non-rupture of the Graafian follicles seldom appear to form a large tumour. Commonest form is the *multilocular cyst*, originating in morbid changes in the stroma

and follicles, and containing glairy fluid more or less coloured; contents may be partly solid. Another type is the *parovarian cyst*, unilocular or nearly so, and containing clear, watery, transparent fluid. It arises in the broad ligament, probably independent of the parovarium. A third is multilocular, and contains exuberant papillary growths in its cavities. This also holds clear fluid, and is believed to be developed from vestigial relics of the Wolffian body in the hilum of the ovary or in the parovarium. Lastly come *dermoid cysts*, containing hair, sebaceous matter, teeth, bone, and walls lined with skin bearing complete glandular structures.

Symptoms.—Gradual distension of abdomen; a prominent fluctuating tumour occupies the hypogastric, umbilical, and often epigastric regions of the abdomen, extending more or less into the flanks. May bulge into Douglas's pouch, where it can be felt from the vagina, or may draw uterus high up; then it cannot be detected by vaginal examination.

Diagnosis.—From *ascites*: as the patient lies supine, the bulging and dulness is in the front of the abdomen in cystic ovarian disease, in the flanks in ascites; in the latter resonance is altered by change of position, but not in the case of ovarian cyst. From *cystic kidney*: in this disease the dulness is very marked in one flank, and seldom extends far across the median line to the opposite side of the abdomen. It may push the colon forwards, which may be detected, as a cord, or a tube resonant on percussion, in front of it. From *hydatid cysts*: when in the liver, there is resonance in the lower part of the abdomen, but abnormal dulness to the right side above; the fluctuating cysts project from the solid liver. When in the great omentum, the abdomen becomes distended, but not prominent anteriorly; the small fluctuating cysts can be detected separately, feeling on palpitation like potatoes in a sack. In all cases of hydatid disease tapping will procure the characteristic fluid. From *fibro-cystic uterine tumours*: chiefly by introducing the sound into the uterus. If it move very intimately with the tumour that growth may be uterine, or else an ovarian cyst with very close connections with the uterus. The diagnosis from soft solid growths must depend on careful palpation.

Complications.—*Inflammation* of the cyst wall, indicated by sudden attacks of abdominal pain, and generally causing adhesions to abdominal walls, omentum, or viscera. *Suppuration* of cyst, indicated by rigors. *Strangulation* of cyst by twisting on its own pedicle, so as to obstruct its nutrient vessels. If partial, this may cause diminution in size of cyst from atrophy ; if complete, the cyst will slough, with fatal results if not relieved. *Rupture* of cyst, from violence or from degeneration of its walls ; the tumour gets suddenly smaller and less defined, with more or less severe abdominal symptoms.

Treatment.—If patient be very weak, and suffer from extreme distension, the tumour may be tapped, and operation deferred a few weeks. Under other circumstances, tapping should be avoided. It is always right to operate as early as possible. The only cases of suspected ovarian tumour where operation is not justifiable are those where great bulk of the tumour after very rapid growth, marked cachexia, and solid œdema of the legs indicate an advanced stage of malignant disease.

OVARIOTOMY.—Perform the operation about a week after a menstrual period. See that the bowels are cleared out by an aperient given two nights before operation, followed by an enema early in the morning of operation. Take care that the bladder is emptied by catheter before the patient is placed on the operating-table, and bear in mind the precise number of sponges and pressure-forceps which you bring into the operating-room. *The Operation.*—Place the patient on her back, with shoulders slightly elevated. Fix her knees and wrists by means of straps, and apply a large waterproof sheet to the body and legs, with a hole cut in it to fit the prominent abdomen. The edge of the hole is made to adhere to the integuments by resin ointment. The lowest part of the edge must lie above the pubes. Make an incision a few inches long over the linea alba, beginning about an inch below the umbilicus. Bleeding vessels are best secured till the end of the operation by pressure-forceps, which check haemorrhage permanently. When the peritoneum is divided and the cyst exposed, plunge the special trocar into the tumour, with-

drawing fluid contents through cannula into a pail or other receptacle under the table. Break down solid contents of cyst with hand introduced into the tumour. If there be adhesions to parietal peritoneum, break them down with hand, and secure any bleeding vessels; adherent omentum must be cut away, and the vessels secured; pelvic and visceral adhesions require great care in separation. Then place two or three clean sponges in pelvic cavity and above tumour. Raise the flaccid tumour out of the wound; the pedicle must then be transfixated (avoiding large veins) by a stout needle armed with two stout silk threads. The ends of each thread on *one* side of the pedicle must be crossed over each other, then tie the free ends round the opposite sides of the pedicle. If the outer border of the pedicle be very tense, secure the ovarian vessels separately, else they will slip. The pedicle, if very broad, may require a second transfixion; then one end of the second thread must be passed through the eye of the needle with a third thread, and crossed on one side as before. The ends of the threads are then tied together. Next cut the tumour away, and keep the pedicle well in sight, held up by two pairs of pressure-forceps entrusted to the assistant, till the end of the operation. (In some cases the cyst is sessile, pressing against the uterus, and encapsuled by the layers of the broad ligament. The capsule must then be sufficiently incised to admit the forefinger, the tumour must be enucleated, and all vessels secured by pressure-forceps as they are divided. The remains of the broad ligament, after the cyst and as much of its capsule as is advisable have been cut away, may be transfixated as a pedicle, or, better still, left loose after every bleeding point has been carefully secured; in the same way a portion of the cyst wall may be safely left behind if too deep or too closely attached to the capsule to be removed.) After the tumour is removed search for the other ovary, and remove it, if it be distinctly cystic. Then take out the sponges, and see if they show that there has been fresh haemorrhage from separated adhesions; use fresh sponges to mop up any cystic fluid or clots that may have escaped into the cavity of the peritoneum. Remove all forceps and sponges, count them, sew up abdominal wound

with silk thread or silkworm gut threaded to a needle at each end, introducing the needles from the peritoneal side, and avoiding the recti muscles. Some operators use the cautery instead of the ligature for securing the pedicle ; the clamp is almost entirely discarded. Lister's precautions valuable in this operation. In cases of strong adhesions, with exudation from peritoneum after they have been separated, pass a glass drainage-tube into Douglas's pouch through the abdominal wound. When exudation of bloody serum is hard to clear with sponges, though all visible bleeding vessels have been secured, flush out the peritoneal cavity with water heated to about 100°. Several pints must be poured in at once, in a steady current. To expel the water, press the sides of the abdomen and finish with sponges.

OVARY, SOLID TUMOURS OF THE.—Fibroma or fibro-myoma sometimes observed in the ovary. Its occurrence there can be understood now that the strong resemblance of the spindle-cells in the stroma to uterine tissue is well recognised. Sarcomata and carcinomata form solid tumours distinguished from uterine growth by their being free from the uterus, as the sound will detect. They are nearly always accompanied by ascites : the health rapidly deteriorates. *Treatment.*—Fibromata and even malignant tumours may be removed by ovariectomy. Abdominal wound must be large, often extending above umbilicus ; the pedicle is generally very thick and vascular. With regard to malignant growths see page 475.

OOPHORECTOMY is the removal of the ovaries, when of normal size or not the seat of large tumours, for checking the growth of uterine fibroids, especially when they are the cause of much haemorrhage ; the operation is also performed in cases of severe dysmenorrhœa with serious general symptoms. *Operation.*—Make abdominal wound as in ovariectomy, draw the ovary out, transfix the broad ligament close to the uterus and ligature it, so as to treat it as the pedicle of a large ovarian tumour ; then cut away the ovary and the Fallopian tube. *Caution.*—When operation is performed in a case where a large solid uterine* myoma exists, it is often exceedingly difficult to get hold of either or both ovaries, and still harder to secure the broad

ligament as a pedicle : it may then be found to be safer to amputate the uterus above the cervix, and to remove it with its appendages. When oophorectomy is performed for the cure of dysmenorrhœa, &c., the ovaries being small and the abdomen flat, take great care to protect the intestines with flat sponges, and be sure that the patient is thoroughly under the influence of the anæsthetic when the pedicle is being secured, as sudden spasm of the recti may produce much protrusion of intestine and may cause the operator to pull the ovary roughly, lest it should slip from his fingers, and thus the broad ligament may be torn. In all cases of oophorectomy be sure that you leave no ovarian tissue behind.

Uterine Tumours.—Pedunculated myomatous outgrowths from the body of the uterus may be removed by an operation resembling ovariotomy, the pedicle being transfixed in the same manner. Be always prepared to remove the entire body of the uterus, as such pedicles are often very hard to secure, and the outgrowth may prove to be almost or quite sessile.

Hysterectomy.—Body of uterus may require removal in some cases of general enlargement ('fibroid'), or when it is covered with large and numerous myomatous outgrowths. Operation should not be performed except when the growth of the tumour is rapid and the patient is young and probably far from the menopause, or when haemorrhages are frequent and severe, and oophorectomy is found to be impracticable (see OOPHORECTOMY), or when the patient is actually crippled by the weight and pain of the tumour. Be certain beforehand that the cervix is free, or almost free, from 'fibroid' enlargement, else it cannot be clamped without great difficulty. **Operation.**—Make a sufficiently large abdominal incision and draw out the uterus ; take care that no sessile outgrowths are wrenched off during the process ; if such an accident happen, the assistant must keep a sponge pressed against the raw surface on the uterus till that organ is removed. Separate adhesions, being particularly careful of the omentum. Pass the stout iron-wire loop of a Koeberl's *serre-nœud* round the neck of the tumour—that is, round the lower part of the uterus or the upper part of the cervix, and draw it very tight by pulling on the handle

of the clamp. Then transfix the pedicle horizontally, on the uterine side of the wire, never on the cervical side, by two stout pins, so that the ends of the pins, guarded by a special contrivance, lie, on each side, outside the abdominal wound, and prevent the pedicle from slipping. Guard the intestines with sponges, then cut the uterus away; the assistant must keep his sponge close to the operator's scalpel, as the haemorrhage from the uterus is often very considerable. Clean the peritoneal cavity very carefully, and take great care not to leave fluid blood and clots between the front of the pedicle and the bladder. Then close the abdominal wound by sutures, brought close up to the pedicle. Tighten the wire of the clamp daily, or oftener, if necessary, and keep the surface of the pedicle clean and dry by iodoform. In about three weeks the distal end of the pedicle will separate. Intra-peritoneal treatment of the pedicle involves more difficulties to the operator than he will meet with when the clamp is used.

Operations for the total removal of the uterus, including the cervix, for cancer, are difficult and dangerous; they demand great experience in abdominal surgery on the part of the operator. See 'The Present Status of the Operation of Extirpation of the Uterus for Malignant Disease,' by H. C. Coe, *Annals of Surgery*, vol. ii. 1885. Supravaginal amputation of the cervix for cancer is another operation not satisfactorily established.

PORRO'S OPERATION.—This term is only correct when used to signify 'Caesarean section, followed by removal of the uterus, together with its appendages, including the ovaries, leaving only the cervical portion of the uterus' (Clement Godson). Preferred to Caesarean section because stump of uterus is secured outside abdominal wound, avoiding internal haemorrhage or escape of lochia into peritoneal cavity. Performed under same conditions as the older operation.

Operation.—Abdominal incision as in ovariotomy. Before opening uterus avoid any part that seems livid or very vascular, so as to suggest site of placenta. Make a small incision large enough to admit finger through lower third of uterus, then tear uterine substance upwards, thrust hand into

uterine cavity and seize child by neck, extract it and sever umbilical cord, securing as in ordinary labour. Waste no time in attempting to separate placenta. During extraction of child, assistant must slip wire of a Koeberlé's *serre-nœud* around neck of uterus at level of internal os, including both ovaries and tubes. Remainder of operation precisely as in HYSTERECTOMY (*which see*), the same pins as well as the same clamp being used. For an exhaustive monograph on the operation, with tables of 137 cases, see 'Porro's Operation,' by Dr. Clement Godson, *Brit. Med. Journal*, vol. i. 1884, p. 142.

Fallopian Tubes, Diseases of.—Abnormal patency, inflammation, morbid growths.

ABNORMAL PATENCY.—Matthews Duncan and others have shown that a Fallopian tube may be sufficiently open to allow passage of uterine sound into peritoneal cavity. When this occurs unexpectedly, results are seldom serious, but surgeon should not attempt deliberate catheterisation or instrumental dilatation of tubes—a difficult and dangerous proceeding that has not proved of any benefit, for whatever reason it has been employed. Never forget, when operating on the female organs or ordering vaginal injections, that the tubes form two highways into the peritoneal cavity, along which may be borne irritating fluids, inflammatory processes, or septic germs. This leads to the subject of

INFLAMMATION, OR SALPINGITIS.—Acute form may follow abortion, delivery at term, or gonorrhœa, from entrance of morbid material into the tubes; very severe, and always complicated with symptoms of inflammation of uterus, ovaries, or pelvic peritoneum. Chronic salpingitis not rare, probably result of extension of inflammation in neglected cases of disease of other parts of the genital tract; generally accompanied by perimetritis through escape of products of inflammation into peritoneum. Liable to result in hydrosalpinx or pyosalpinx.

HYDROSALPINX.—Distension of Fallopian tube by serous or mucous fluid. Probably caused by salpingitis and closure of ostium of tube by inflammatory adhesions between fimbriæ, the uterine orifice being also blocked from swelling of the

mucous membrane. *Symptoms.*—Dysmenorrhœa with scanty or profuse 'show'—as a rule the latter. Often intense crampy pain replacing natural orgasm in complete coitus (true dyspareunia), due to some disturbance in the muscular apparatus of the tubes and uterus. On pelvic examination an elongated fluctuating swelling may be detected on one side of the uterus. In rare cases the dilated tube may form a tumour rising above the pubes.

Pyosalpinx.—Distension of Fallopian tube by pus. A result of chronic salpingitis. Symptoms as in hydrosalpinx, with more or less marked signs of suppuration. Very intractable. Has been known to cause fatal peritonitis by sudden rupture of diseased tube.

Treatment of Inflammatory Diseases of Tubes.—In early stages of salpingitis, rest, fomentations to iliac fossæ. Hydro-salpinx and pyosalpinx sometimes demand removal of diseased part. It is best and easiest to perform OÓPHORECTOMY (which see). Operation always difficult, and generally complicated by perimetritic adhesions. See Lawson Tait, *Disease of Ovaries*, 1883. Never think of operating until the effects of prolonged rest have been observed. Many cases recover without treatment.

Hæmatosalpinx is distension of a Fallopian tube with blood, the source of which is still disputed. May be a result of salpingitis.

Morbid Growth.—Papillary masses may grow from the tubal mucous membrane, and form a small oval tumour. If the ostium be not blocked, the discharge from the masses may cause inflammatory ascites. A tumour of this kind should be removed with the ovary. Other growths—small cysts, fibromata, or mucoïd polypi—do not require surgical treatment. In all cases of tumour in the neighbourhood of the tubes, bear in mind possibility of extra-uterine gestation, and therefore be careful to ascertain entire sexual history of patient.

TOOTHACHE.¹

Toothache is a pain arising from a lesion, either within or about the region of a tooth. *Causes.*—Caries ; irritation of the pulp ; acute and chronic inflammation of the tooth-pulp ; acute and chronic periodontitis ; exostosis and necrosis. *Symptoms.*—When toothache arises from caries, the pain is of a dull aching character, and is *treated* by the application of creasote, morphia, mastiche, and various anodynes, which are inserted into the cavity of the affected tooth, and then in a few days the carious matter excavated, and metallic fillings placed in the tooth. In irritation of the pulp the pain is the same as in the above affection, but is more prolonged and is treated in the same manner.

TOOTHACHE FROM ACUTE INFLAMMATION OF THE PULP is recognised by the pain, which is at first confined to the affected tooth, being of a dull aching character, which soon becomes more intense and lancinating, and appears to spread over entire side of head and face. Disease is almost always accompanied by caries, and may run on to suppuration and gangrene of the pulp. *Treatment.*—In children the extraction of the offending tooth is generally called for ; but in adults, either application of arsenious acid, $\frac{1}{20}$ of a grain, may be used to hasten the destruction of the diseased pulp, or the constant and renewed application of carbolic acid on pellets of cotton-wool may attain the desired end. The tooth may then be afterwards filled.

CHRONIC INFLAMMATION is generally the sequel of acute inflammation of the tooth-pulp, and, if the occurrence is frequent, the tooth had better be extracted. The pain is of a dull and gnawing kind.

ACUTE PERIODONTITIS may arise from a blow, or be the sequel of acute inflammation of the pulp, or may arise from constitutional causes, such as rheumatism or scrofula. Pain commences with a feeling of uneasiness, which increases to an

¹ Contributed by the late Mr. I. Lyons, Dental Surgeon to St. Bartholomew's Hospital.

aching, combined with great tenderness on pressure. The tooth is felt long, neighbouring teeth become involved, and the inflammation spreads to the palate and cheek, which is swollen and oedematous. Suppuration takes place, pus is formed, and an abscess may burst at any point, either external or internal to the dental arch. *Treatment.*—If the tooth is far involved in caries, extraction of the offender is the best remedy. When it is desirable that the tooth should be retained, applications of poultices or poppy fomentations are of great benefit, but must be applied inside the mouth only, and about the region of the affected tooth ; or local bleeding by leeches, and free incisions, and the prescribing of such constitutional remedies as may be indicated.

CHRONIC PERIOSTEAL INFLAMMATION is generally the sequel of the above disease. The character of the pain is the same, but more modified, and the treatment is nearly always extraction of the tooth.

DENTAL EXOSTOSIS is an outgrowth of osseous tissue from the surface of the cementum of the fang. The usual cause of it is chronic periodontitis. The pain is of a neuralgic character. Extraction is the only available *remedy*.

NECROSIS arises when the fang of a tooth becomes denuded of its periosteum, and its most frequent cause is acute periodontitis.

NOTES ON OPHTHALMIC SURGERY,
BY
HENRY JULER, F.R.C.S.

SURGEON, ROYAL WESTMINSTER OPHTHALMIC HOSPITAL;

JUNIOR OPHTHALMIC SURGEON, ST. MARY'S HOSPITAL;

LATE CLINICAL ASSISTANT, ROYAL OPHTHALMIC HOSPITAL, MOORFIELDS.

CATARACT—Central, Cortical, Lamellar, Pyramidal, Posterior polar, Traumatic, Secondary. Operations. Spectacles.

CHOROID—Hyperæmia, Choroiditis, Sclerotico-Choroiditis Posterior, Tuberclæ, Tumours, Bone-formation, Coloboma, Rupture.

CILIARY REGION—Sympathetic Irritation, Sympathetic Ophthalmitis.

CONJUNCTIVA—Ophthalmia Neonatorum, Gonorrhœal, Mucopurulent, Diphtheritic, Granular. Xerophthalmia. Pinguecula. Pterygium.

CORNEA—Local Keratitis, Ulceration, Hypopyon, Onyx, Syphilitic Keratitis, Punctate Keratitis, Arcus Senilis, Pannus, Peritomy, Conical Cornea, Wounds.

EYELIDS—Blepharitis, Sty, Tarsal Tumour, Warts, Rodent Ulcer, Syphilitic Ulcer, Lupus, Nævus, Ptosis, Trichiasis, Symblepharon, Entropion, Ectropion.

GLAUCOMA—Acute, Chronic, Secondary.

IRIS—Iritis, Iridectomy, Iridotomy, Iridodesis, Prolapse, Coredialysis, Congenital Irideremia, Coloboma, Mydriasis, Myosis.

LACHRYMAL APPARATUS—Mucocoele, Stricture of Nasal Duct, Fistula of Lachrymal Sac. Lachrymal Gland, Diseases of, Excision of.

OPTIC NERVE—Optic Neuritis, Atrophy.

REFRACTION—Emmetropia, Ametropia, Presbyopia, Myopia, Hypermetropia, Astigmatism.

RETINA—Retinitis, Syphilitic, Albuminuric, Apoplectic, Pigmented. Detachment. Glioma.

STRABISMUS—Internal, External, Operation.

Cataract is an opacity of the crystalline lens. Various classifications are used. The following is perhaps the best : (1) *Central* ; (2) *Cortical* ; (3) *Lamellar* ; (4) *Pyramidal* ; (5) *Posterior polar* ; (6) *Traumatic* ; (7) *Secondary*.

1. **CENTRAL OR NUCLEAR**.—Opacity begins at centre and shades off towards circumference. It mostly occurs in old people, when it is hard at the centre and of amber colour. When occurring before the age of 35 it is softer and whiter.

2. **CORTICAL OR RADIATING**.—Opacity begins at surface of lens as triangular or pyramidal streaks pointing towards centre. When advanced they involve whole structure of lens.

3. **LAMELLAR OR ZONULAR.**—Opacity consists of a shell-like layer deposited within the substance of the lens at a variable distance from its surface. It occurs in very young subjects (1 to 3 months), and is sometimes congenital ; the subjects of it frequently suffer from infantile convulsions.

4. **PYRAMIDAL.**—Occurs as a very white well-defined opacity on front part of lens just beneath the capsule. It is generally caused by ulcer of cornea following purulent ophthalmia, and consequently is generally associated with opacity of cornea.

5. **POSTERIOR POLAR.**—Begins at posterior part of chief axis of lens and radiates ; generally associated with disease of choroid and vitreous.

6. **TRAUMATIC.**—Follows wound of the lens-capsule by which the aqueous humour is admitted to the lens-substance, causing swelling, opacity, and final absorption of this, and leaving only a chalk-like deposit upon the remaining capsule.

7. **SECONDARY CATARACT** is so called when it is the result of some other *local* disease, as glaucoma, irido-cyclitis, &c., or of some *general* disease, as diabetes mellitus.

Any combination of the above forms would be called a *mixed* cataract. The degree of hardness of a cataract depends chiefly upon the age of the patient, all cataracts occurring before the age of 35 being 'soft.' Cataracts occurring before or within a few months after birth are called *congenital* ; they are generally associated with some other defects in the eye. As a rule the whole lens is opaque, but the cataract may be of the lamellar, the nuclear, or of the anterior pyramidal kind.

Diagnosis.—Gradual failure of sight without local inflammatory symptoms is a subjective indication of cataract. A greyish appearance of the pupil is often observed in old people, which is *not* due to cataract, the lens being transparent. When the presence of cataract is suspected the pupil should be dilated by atropine and examined : (1) *By focal illumination*, that is, by condensing the rays of light from a lamp upon the pupil by means of a convex lens. This will cause the otherwise clear lens to appear white, amber-like, or brownish, as the case may be. (2) *By the Ophthalmoscope*, when the opacity of the

lens will appear as dark patches, streaks, or a central nucleus; the red choroidal reflex will only be observed inversely as the amount of opacity. In *lamellar cataract* a well-defined shell of opacity appears, surrounded by a clear (cortical) layer of lens-substance, through which the bright red choroidal reflex is observed. When any portion of the lens-substance remains clear, note should be made as to the state of the vitreous, optic disc, retina, and choroid, with a view to probable fitness for future operation. *Opacities of cornea* will also appear as dark patches with ophthalmoscope, and may be seen by superficial examination. *Opacities of vitreous* usually appear as moving bodies, and are distinguished by their continuing to move after the patient's eye has suddenly come to rest; sometimes, however, they are fixed and can be detected by direct ophthalmoscopic examination.

Treatment.—In earlier stages of nuclear cataract the sight may often be improved by moderate dilatation of the pupil by atropine. Use atropine drops, gr. j. ad $\frac{3}{4}$ j., once or twice a week. Dark spectacles may be worn, to favour dilatation of the pupil. In lamellar cataract the patient can often see fairly well. When vision is seriously impaired and the margin of translucency is *wide*, make an artificial pupil by iridectomy; when the margin is *narrow*, perform the operation of solution, or of extraction. In forms other than lamellar, sight can be restored only by one of the following methods of operating on the lens. (1) *Extraction*; (2) *Needle operation*; (3) *Suction*.

Cocaine is now used to produce local anaesthesia in almost all operations on the eye. In all cases where the eye is uninflamed this drug produces the most satisfactory results when properly applied. In inflammatory cases, however, such as acute or sub-acute iritis, panophthalmitis, acute glaucoma and other affections attended with inflammatory redness and infiltration of the tissues, this drug appears to be imperfectly absorbed, and so, although it may diminish sensation, it does not abolish the pain produced by incisions. A five per cent. solution of the hydrochlorate of cocaine in distilled water with one per cent. of boric acid is the strength generally employed

for ophthalmic operations. The solution must be dropped into the palpebral sac at intervals of five minutes for five or six times immediately preceding the operation. Should the operative procedure be a long one the instillation of cocaine should be kept up during its performance, as the effect of the drug begins to pass off after fifteen minutes.

A few drops of the solution injected beneath the conjunctiva is very effective and produces no ill-effects, but a large amount of fluid causes artificial chemosis, which is apt to be confusing to the operator.

For all operations on the cornea, cataract-extraction, iridectomy, squint, and other operations cocaine is vastly superior to a general anaesthetic.

1. EXTRACTION.—Various methods are in use at the present time of which the chief are (1) the *old flap operation*, and (2) the modified linear method of Graefe.

(1) *The old flap operation* is gradually passing into disuse. In it a triangular (Beer's) knife is employed; the incision is made just within the margin of the cornea, concentric with it, equal to half its circumference, and parallel to the plane of the iris. Some surgeons perform iridectomy, others not. The capsule is then lacerated and the lens extracted as in the following operation.

(2) *Graefe's modified linear method*.—In this the incision is made with a long narrow (Graefe's) knife; this is held with its cutting edge upwards, and is made to enter the sclerotic at a point 2 mm. below the upper tangent of the vertical meridian and lying on the tangent of the transverse meridian of the cornea, and to penetrate the anterior chamber; the direction of this penetration should be downwards and inwards towards the pupil; the knife having reached the middle of the anterior chamber, its handle is slightly depressed and its point pushed steadily upwards in front of the plane of the iris so that a counter-puncture may be made in the sclerotic on the opposite side, in a position which should correspond to that of the puncture. The knife is now made to cut its way upwards through the sclerotic, and to come out at the junction of this with the upper part of the cornea; this is effected by

pushing the knife steadily onwards as far as its heel, and then withdrawing it if necessary. Iridectomy is usually performed either at this stage of the operation or as a preliminary measure some weeks previously. The globe being held steady by an assistant, the iris is seized with the iris-forceps near its pupillary edge and drawn just outside one angle of the wound ; whilst slight traction is made on it in this position a snip is made through its outer part with the iris-scissors ; the portion of the iris held in the forceps is then gently drawn across to the other angle, and its incision completed as near the periphery as possible. The laceration of the anterior capsule of the lens is the next step ; the cystitome is now to be gently passed, on the flat, into the anterior chamber ; when it has reached the lower edge of the pupil its point is rotated towards the capsule, and the latter is freely lacerated from below upwards and from side to side. The removal of the lens is then effected by the exercise of gentle pressure with the back of a curette upon the sclerotic and lower part of the cornea ; the edges of the wound are seen to become separated, and the upper edge of the lens presents itself between them ; by the continuance of this pressure in a direction backwards and slightly upwards the lens is presently expelled.

When the lens cannot be removed in this way it is often necessary to introduce a scoop, which is passed behind it.

The chief complications occurring during the operation are (1) escape of the aqueous before the completion of the incision, whereby the iris bulges forwards in contact with the edge of the knife. This is not serious, the section must be completed notwithstanding. (2) Hæmorrhage into the anterior chamber sometimes follows the iridectomy ; it usually ceases after a few minutes, and the blood can be evacuated by gentle pressure with the end of the curette upon the posterior flap of the wound, or by gently stroking the cornea from below upwards. (3) Difficulty in removing the cataract : (a) the lens may be dislocated into vitreous ; (b) the wound may be too small ; (c) the capsule may be incompletely lacerated. (4) The vitreous humour may escape either before or immediately after the extraction of the lens. This is a serious complication and

must always be a signal for instant cessation of pressure upon the globe and removal of the lens with the scoop.

After-treatment.—Keep the patient in bed for several days. Apply a piece of soft linen to the closed eyelids, and a pad of cotton-wool over this to both eyes, and secure by a four-tailed bandage. Keep the room nearly dark. Remove dressing, and gently cleanse the lids with warm water twice daily, just separating their edges to allow escape of tears that may be retained. During the first few hours there will be some soreness, and the first dressing a little bloodstained ; after this there should be no pain, and only a little mucous discharge. If doing well there will be slight congestion, but no chemosis, edges of wound united, and pupil black. Discontinue bandage after eight or ten days, and order a large shade.

2. NEEDLE OPERATION FOR SOLUTION.—(1) Dilate pupil by atropine. (2) Use cocaine, *see* p. 486. (3) Hold lids open by stop-speculum, and use fixation-forceps to steady globe. (4) Direct a fine cataract-needle to a point just within the margin of the cornea, plunge freely and obliquely through into anterior chamber, and carry point to centre of pupil. (5) Dip point of needle back through the capsule into superficial layers of lens at centre, make a few gentle to-and-fro movements, so as to break up its substance, then steadily withdraw the needle.

After-treatment. Dilate the pupil with atropine (gr. iv. ad $\frac{3}{4}$ j.) three times daily. Bandage the eye lightly, and employ dark room for several days. In case of iritis apply leeches to region of eye, and ice or evaporating lotions to lids. The result varies with the amount of opacity of the lens. In cases of complete cataract no marked change will be observed for some weeks after operation. In partial cataract the ruptured portion of the lens will become opaque and swollen in a few days, after which it will gradually become absorbed. When the eye has become quiet and free from inflammatory redness the operation may be repeated, and the needle used more freely. A third or fourth operation may be required.

3. SUCTION OPERATION.—Only applicable to soft cataract, and requires great skill in its performance, to avoid danger of iritis, or cyclitis. (1) Dilate pupil with atropine. (2) Make

oblique opening in cornea with a broad cutting needle between its centre and its margin, and lacerate capsule freely. (3) Withdraw needle and pass nozzle of syringe through wound, and dip into lacerated lens-substance. In lamellar cataract, and some other cases, it is necessary to allow an interval of three days between the needle operation and the suction, in order that the lens may be softened by the admission of the aqueous. (4) Use very gentle suction, and remove if possible the whole of lens-substance at one sitting. *After-treatment* is the same as for needle operation (but in the case of waiting careful watch must be made, and suction performed *at once* if inflammation be set up by the rapid swelling of the lens).

When to perform Extraction.—The more complete the opacity of the lens, the more easily is it shelled out of its capsule ; whilst in immature cataract some of the transparent lens-substance is apt to remain ; this will become opaque and may interfere with result of operation. The signs of this 'ripe' condition are—(1) No shadow of iris thrown upon lens within the pupillary area. (2) No choroidal reflex with ophthalmoscope. (3) Patient is able to distinguish light from darkness, but is unable to count fingers when held up before the eyes. In very old people the lens will often come away easily before the opacity is complete. When one eye only is affected, or when one is less affected than the other, extraction should be deferred until the better eye is no longer useful, unless for special reasons. When both cataracts are mature, only one *should be operated on at a time*, with an interval of a few months. When there is no perception of light do not operate, as cataract alone is not sufficient to prevent this.

Occasional Results of Extraction.—1. *Sloughing of Cornea*, very rare since flap operation was abandoned. 2. *Suppurative inflammation* extending from wound to the whole cornea, iris, and vitreous, variable in degree, but, when established, generally going on to suppurative panophthalmitis, or to severe plastic irido-cyclitis with corneal opacity and contraction of eyeball. 3. *Iritis* of a plastic nature, which may deposit a membrane in pupillary area. 4. *Prolapse of Iris* into the wound either at the time of operation or afterwards. 5. Opacity of anterior or of posterior capsule of lens.

Conditions of Sight after Operation.—Results are good when, with the aid of proper spectacles, patient can read any of Snellen's test types from No. 1 to No. 14 at 22 centimètres (8 inches), and from No. 6 to No. 24 at 6 mètres (20 feet). The operation renders the eye very hypermetropic for want of the lens. Very strong convex glasses are required to compensate for its absence. Glasses should not be worn for three months after operation, and then not continuously at first. Two pairs of spectacles are needed, one pair making the eye emmetropic and giving clear vision for distant objects (about + 12 dioptrés), the other pair stronger, to render the eye myopic, so that the patient is able to read, &c., at about 8 or 10 inches (about + 16 dioptrés).

Choroid. — DISEASES. — 1, *Hyperæmia* ; 2, *Choroiditis* ; 3, *Sclerotico-choroiditis Posterior* ; 4, *Tubercle* ; 5, *Tumours* ; 6, *Bone-formation* ; 7, *Coloboma* ; 8, *Rupture*.

CHOROIDITIS may be (1) *Syphilitic*, (2) *Simple*, (3) *Suppurative*.

SYPHILITIC CHOROIDITIS is the most common. It is characterised by the presence of numerous distinct patches scattered about fundus, but most abundant towards periphery ; they are at first of a yellowish-red appearance, which soon changes to yellowish-white or glistening white, according to the extent of choroidal atrophy. The patches are more or less pigmented. Vision is affected in proportion to the extent of the disease. Usually no pain. Generally a history of acquired or inherited syphilis. *Treatment.*—Mercury combined with iodide of potassium. Rest of eyes by means of dark room. Artificial leech or dry cupping to temples. In the early stage mercury does great good, and in old cases where failure of sight is increasing it should be given. *Prognosis*, guarded.

SIMPLE CHOROIDITIS.—In this form the patches of atrophy are similarly distributed, but are confluent (compare with syphilitic form). Or large areas of incomplete atrophy are interspersed with separate patches, or there may be a widespread superficial atrophy with pigmentation. The field of vision is here also affected in proportion to the change.

SUPPURATIVE CHOROIDITIS is acute, and occurs in conjunc-

tion with similar inflammation of neighbouring parts (panophthalmitis).

SCLEROTICO-CHOROIDITIS POSTERIOR is limited to the regions of the optic disc and yellow spot, which present many varieties of localised change. It is common in myopic eyes, and the appearances thus produced are known as 'posterior staphyloma,' 'myopic crescent,' &c.

TUBERCLE OF CHOROID appears in the form of small circular, circumscribed spots (0.3 to 2.5 mm.) situated chiefly in the region of optic disc.

TUMOURS.--1, Sarcoma ; 2, Carcinoma.

BONE-FORMATION sometimes occurs on the inner surface of choroid of eyes which have been long destroyed ; it varies in thickness from a mere film to a dense osseous cup.

RUPTURE OF CHOROID may occur from a blow on the globe, and may exist with or without rupture of other coats. Haemorrhage at once occurs, and blood may be effused (1) between choroid and retina ; (2) between choroid and sclerotic ; (3) into vitreous.

Ciliary Region.--**SYMPATHETIC IRRITATION** and **SYMPATHETIC OPHTHALMITIS.**--In sympathetic irritation the changes in the sympathising eye are chiefly functional. In sympathetic ophthalmitis they are of a destructive inflammatory kind.

Pathology.--The exact mode of transmission from the exciting to the sympathising eye is not well known. Very interesting facts are known.

1. The change commences in the region of the ciliary body and iris of the exciting eye, and its effects are mostly seen in the corresponding part of the sympathising eye. This region is richly supplied by branches of ciliary nerves (fifth, sympathetic, and third).

2. In exciting eye inflammatory changes are always found, and in some cases have been found to extend to the ciliary nerves.

3. The latest researches (Brailey, Leber, Snellen) tend to show that the inflammation passes along the optic nerves from the exciting to the sympathising eye, most probably by means

of the lymph-space (sub-dural) surrounding the nerves, or by the trabecular tissue of the same.

Symptoms in Sympathising Eye.—1. *Irritation.*—Eye extremely weak and irritable ; patient may be able to read No. 1 of Snellen's type, but soon becomes tired, because the power of prolonged accommodation fails. Eye sometimes reddened, may be watery ; neuralgic pains common. Iris not affected. *No plastic exudation nor disorganising changes take place.* Liable to recur. Excision of exciting eye at once cures the irritation.

2. *Ophthalmritis.*—Begins from one to three months, or more, after affection of exciting eye. May be ushered in by irritation. May be well marked from the first, or may commence in a manner so insidious as to escape notice. It consists chiefly of irido-cyclitis or irido-choroiditis, the iritis evincing a tendency to the formation of tough and extensive synechiae. There is a zone of ciliary congestion. Thickening and muddy appearance of iris. Tendency to formation of dots of opacity (keratitis punctata) on the posterior layer of the cornea. The vitreous, when the condition of the pupil allows it to be seen, presents floating opacities. There may be neuro-retinitis. Tension of globe often increased. In the mildest forms of the disease there may be only slight serous iritis. In severe cases the eye either shrinks or may become glaucomatous with bulging of the sclerotic, total posterior synechia, secondary cataract.

Treatment.—1. When there is, as yet, neither sympathetic irritation nor sympathetic ophthalmritis, the injured eye must be watched as to the seat of its inflammation, and if this is found to threaten the iris and ciliary region, precaution must be taken to do all that is possible to subdue it. Atropine should be applied. Patient kept in dark room for long period. Eye bandaged.

2. If irritation is set up, the foregoing remedies to be applied to *both* eyes, and if the exciting eye is past hope of recovery it should be *excised at once* ; but if useful vision remains, the patient must be warned of the danger with which the second eye is threatened while retaining the injured eye.

3. If ophthalmritis is established and exciting eye *quite*

~~blind~~, it should be excised at once ; but if any useful sight remains, it should be saved, as it may prove the better eye in the end.

In the latter case, do all you can to save both the exciting and the sympathising eye. (1) Use atropine drops every few hours ; (2) rest the eyes by exclusion of light ; (3) apply leeches, blisters, warm fomentations, &c.

Conjunctiva.—**OPHTHALMIA.**—This term is applied to all forms of conjunctivitis. Chief forms are—1, *Purulent* ; 2, *Muco-purulent* ; 3, *Membranous* ; 4, *Granular*.

PURULENT OPHTHALMIA is generally due to contact with pus from the urethra or vagina, which may be gonorrhœal or otherwise. The *quality* of the infecting discharge greatly influences the nature of the ophthalmia. When caused by *gonorrhœa* the course is very violent. When occurring in newly-born children it is called *O. neonatorum*.

Symptoms.—In from twelve to forty-eight hours after infection there are itching and slight injection of the conjunctiva ; these soon become intense ; then chemosis, tense swelling of the lids, great pain and discharge, at first serous, then turbid, then uniformly purulent. If untreated the discharge ceases in about six weeks, leaving the palpebral conjunctiva thickened, relaxed, and more or less granular. Cicatricial changes follow. The cornea is in danger from two chief causes, viz. (1) strangulation of the vessels from pressure, and (2) the influence of the discharge. If within the first few days the cornea be hazy and dull, it may partly or entirely slough. In milder cases transparent ulcers may appear and sometimes cause perforation. In many cases no corneal opacity occurs.

Treatment.—When one eye only is affected, carefully protect the other by a watch-glass strapped on. Frequently and thoroughly remove the discharge by free douching with water. Use astringent or caustic lotions or drops every hour in severe cases, *e.g.*, lotio acidi boracici gr. iv. ad $\frac{3}{2}$ j.; lotio zincii, gr. ij. ad $\frac{3}{2}$ j.; lotio hydrarg. perchlor. gr. $\frac{1}{2}$ ad $\frac{3}{2}$ j.; lotio argent. nit. $\frac{1}{2}$ ij. ad $\frac{3}{2}$ j. Apply simple ointment to the eyelids to prevent adhesion. Evert the lids and brush a strong solution of nitrate of silver (gr. x. or xx. ad $\frac{3}{2}$ j.) freely over the conjunctiva once

daily, and well wash off immediately afterwards, either with water or with solution of common salt. Repeat less frequently as the discharge diminishes. In cases where the lids are so swollen that nothing can be applied to their conjunctival surfaces, the outer canthus can be divided.

Treatment should be continued as long as any discharge or granulations remain on the lids, for fear of a relapse, which is apt to occur.

MUCO-PURULENT OPHTHALMIA (Catarrhal Ophthalmia).—Very common, very contagious, mostly attacks both eyes; differs in severity in members of the same household, who are generally attacked at the same time. *Symptoms*.—Congestion of conjunctiva, with patches of ecchymosis. Gritty pain, sometimes severe. Spasm of lids. Free muco-purulent discharge. Lids somewhat swollen and red, never tense. The cornea seldom suffers. Spontaneous recovery takes place in about two weeks. *Treatment*.—Any mild astringent lotion or drops will cut the malady short. An outbreak of this affection in a crowded community is serious. Very common in pauper schools.

MEMBRANOUS OPHTHALMIA (Diphtheritic Ophthalmia).—Very rare in this country, and must not be confused with muco-purulent or purulent ophthalmia, in which there is often a distinct layer of inspissated pus beneath the lids. In membranous ophthalmia the whole thickness of the conjunctiva is occupied by a solid exudation, which is called 'diphtheritic' by some surgeons. It may appear in patches, or may cover the whole inside of the lids.

GRANULAR OPHTHALMIA.—Very common. *Symptoms*.—Firstly, appearance as of small granules like sago-grains on the inner surface of the lower lid, due to inflamed lymphatic follicles. These extend to upper lid; then progressive changes in the palpebral conjunctiva in which it becomes thickened, vascular, and roughened by granular elevations. New tissue is formed in the deep parts of the conjunctiva, which afterwards is partly absorbed, and partly undergoes cicatrical contraction. *Causes*.—Feeble health. Prolonged residence in badly ventilated dwellings. *Treatment*.—Generally tedious.

Evert the eyelids and apply a solution of nitrate of silver (gr. xx. ad 3*j.*) with camel's-hair brush, once, twice, or thrice a week ; or apply the mitigated nitrate of silver stick ; in each case wash the lids with water before inverting them. Solid sulphate of copper may be used instead of these. Glycerine of tannin applied daily is beneficial. *In chronic cases* where the cornea is hazy and vascular (pannus) apply infusion of jequirity seeds to the palpebral *cul-de-sac* six times daily for three days. This sets up purulent ophthalmia, which often cures the granular affection as well as the pannus in about fourteen days. 3*ss.* fresh-ground seed to be macerated in O*j.* cold water for twenty-four hours. *Results.*—(1) Haziness of cornea ; (2) Pannus (*see* Cornea) ; (3) Entropion, Trichiasis.

XEROPHTHALMIA (Xerosis ; Cuticular conjunctiva) is a condition of excessive dryness of the ocular and palpebral conjunctivæ.

PTERYGIUM is a triangular patch of thickened conjunctiva, generally placed opposite the palpebral fissure, its apex pointing to or encroaching upon the cornea. Rare in this country. *Treatment.*—Dissect up from apex and transplant it into a cleft below the cornea. This is said to be more effectual than excision or ligature.

PINGUECULA, a harmless patch of yellowish-white thickened conjunctiva situated near margin of cornea.

Lupus may occur on conjunctiva.

Warts are sometimes seen on the ocular and palpebral conjunctivæ ; they are cauliflower excrescences. To be snipped off with scissors.

Epithelioma and *Sarcoma* may occur on the conjunctiva.

Cornea.—*Inflammation* of the cornea may be circumscribed or diffused ; may involve its proper layers, or may be confined to its anterior or posterior epithelial layer. It may be *local*, leading generally to suppuration or ulceration ; or it may arise from *constitutional* disease, as inherited syphilis. It may co-exist with other inflammations, as in kerato-iritis, cycloiritis.

LOCAL KERATITIS (Corneitis).—*Symptoms.*—Commences with a more or less perfect zone of pinkish-red vessels around

the margin of the cornea. Photophobia more or less severe. Cornea becomes hazy, and has a steamy or ground-glass appearance. Generally there is lachrymation, and frequently pain in and around the eye. *Pathology.*—The intercellular substance becomes opaque from infiltration with leucocytes, which are supposed to have emigrated from the surrounding vessels. The cells of the corneal tissue proper also undergo proliferation into small corpuscles, greatly resembling leucocytes. The disease often has a tendency towards recovery, but more frequently leads to suppuration and ulceration.

Ulceration of Cornea is preceded by inflammatory infiltration, and the inflamed part breaks down at the centre, forming an ulcer with more or less infiltrated base and edges. *Symptoms.*—Photophobia, congestion more or less, consisting of a circular zone of vessels beneath the conjunctiva at periphery of cornea, and sometimes also of conjunctival vessels. Pain sometimes acute.

Ulcers may be, 1, *small and central*, with infiltration of base and edges. These generally heal quickly, but leave a hazy (nebula) or an opaque spot (leucoma).

2. *Small and central, without much infiltration.* These heal slowly and with loss of tissue, perhaps without opacity, but give a *faceted* appearance to the cornea.

3. *Phlyctenular ulcers* (*Herpes corneæ*).

4. *Serpiginous ulcers.*

5. *Acute suppurating ulcer* following abscess or otherwise.

Treatment.—First secure rest, either by bandaging the affected eye, and so reducing friction against eyelids, or by shading both eyes. Soothe local pain by atropine drops or cocaine. In suppurating cases apply hot fomentations to lids; if abscess is defined, open by valvular incision. When indolent, stimulate ulcer by astringent drops, ointment of yellow oxide of mercury, calomel powder, eserine drops (gr. iij. ad $\frac{3}{4}$ j.), &c.

Counter-irritants to temple, as *seton* or *blister*. Constitutional treatment.

HYPOPYON signifies a collection of pus or puro-lymph in the lowest part of the anterior chamber. The pus is derived

(1) from the rupture of an abscess through the posterior layer of the cornea ; (2) from suppuration of the epithelioid layer covering Descemet's membrane ; (3) from surface of iris.

ONYX is a term applied to that condition in which pus is observed between the layers of the cornea at its lower part.

SYPHILITIC KERATITIS (Interstitial K. ; Parenchymatous K.).—*Symptoms.*—The visible changes of the cornea are usually preceded for a few days by some ciliary congestion and lachrymation ; then there is cloudiness in one or more patches, and after a few weeks a ground-glass appearance. Frequently accompanied by iritis and posterior synechiae. Blood-vessels often appear in the layers of the cornea, extending from the ciliary vessels ; they are thickly set in patches (salmon patches), of a reddish-pink colour, and of various shapes ; they may extend all over the cornea, except, perhaps, to the immediate centre. The disease is always symmetrical (contrast with local keratitis), but second eye is usually attacked a few weeks after the first. Age generally between six and fifteen. Often accompanied by inflammation of the ciliary region and iris, *which may give rise to secondary glaucoma*, to stretching and elongation of the globe in the ciliary zone, or to softening of the eyeball ; but, *as a rule*, the cornea throughout its whole structure undergoes a chronic inflammation, showing no tendency either to suppuration or ulceration, the inflammatory products being partially or entirely absorbed after several months. *Cause.*—Inherited syphilis. Other signs of inherited syphilis are usually present. *See CONGENITAL SYPHILIS.*

If no other signs are shown in the patient, a history of infantile syphilis can generally be ascertained, either in the patient or his brothers and sisters ; or a history of acquired syphilis in the parents may be traced. A few cases have been seen in which this disease has occurred as the result of acquired syphilis.

Treatment.—A long but mild course of mercury. Mercurial inunction, grey powder, blue pill, &c. Iodide of potassium may be combined with these. Keep a strict watch against salivation. If the patient be anæmic or strumous, give iodide

of iron, bark, quinine, &c. Keep the eyes shaded. Use atropine drops daily, as iritis may occur without being detected through the opaque cornea. When inflammation has subsided, apply ointment of yellow oxide of mercury to the cornea daily, in order to promote the absorption of the opacity.

KERATITIS PUNCTATA is characterised by the presence of small dots of opacity on the posterior elastic lamina of the cornea. These are frequently so small as to be visible only by the use of a convex lens. They are generally arranged in the form of a triangle, having its apex at the centre, and its base towards the lower margin of the cornea. This condition is generally secondary to some form of inflammation of iris. It is frequently seen in sympathetic ophthalmitis.

Arcus senilis is caused by fatty degeneration of the corneal tissue just within its margin.

PANNUS is the result of friction from a granular condition of the upper lid, trichiasis, &c. It is characterised by haziness of the cornea, with vascularity, the vessels being continuous with those of the conjunctiva, and the anterior layers of the cornea more or less infiltrated with plastic matter. *Treatment.*

—1. Try to cure the granular lids. 2. The operation of *syndectomy* or *peritomy*—that is, the removal of a zone of conjunctival and sub-conjunctival tissue from around the cornea—is strongly recommended by Mr. Critchett in old intractable cases of pannus. 3. The *Jequirity Treatment* (see **GRANULAR OPHTHALMIA**) is eminently successful in these cases, and has quite superseded the inoculation of the conjunctiva with gonorrhœal pus.

CONICAL CORNEA is caused by a bulging forwards of the central part of the cornea, forming a blunt conical curve, which gives rise to irregular astigmatism and myopia. In advanced cases the protrusion of the cornea is very evident, and the apex of the cone may become nebulous. In some cases vision may be improved by concave glasses in combination with a screen having a narrow slit or small hole in it. In advanced cases operation is needed : (1) Graefé's. Shave off apex without entering anterior chamber, then apply mitigated nitrate of silver stick to the raw surface to cause ulceration and cicatri-

sation. (2) Cut off apex with corneal trephine (Bowman's), enter anterior chamber ; leave wound to unite by itself or use sutures ; use atropine drops.

Wounds of Cornea.—When penetrating, if iris is prolapsed, return it, if possible, with a blunt instrument, and order atropine drops ; if it cannot be returned, it must be seized with iris-forceps, and snipped off with scissors ; if iris not protruding, order atropine drops. If only abraded, still order atropine drops. Close the eye with a bandage to prevent friction.

Eyelids.—Blepharitis, Sty, Tarsal tumour, Warty growths, Molluscum contagiosum, Ulcers, Rodent ulcer, Ptosis, Ectropion, Entropion, Symblepharon.

BLEPHARITIS (*tinea tarsi*, *ophthalmia tarsi*, *sycosis tarsi*) is an inflammatory condition of the edges of the eyelid, which commonly attacks the glands and the follicles of the eyelashes. It varies in degree from mere congestion with a sticky exudation to chronic or subacute inflammation with thickening of the tissues, excoriations, and even pustules. *Treatment.*—(1) Keep the eyelids clean and free from scabs by bathing twice daily with warm water or warm alkaline lotion. (2) Apply dilute nitrate of mercury ointment twice daily ; in severe cases cut off the lashes with scissors, and apply nitrate of silver to the edges of the lids. The affection is often caused by an error of refraction. This, if present, should be corrected by glasses.

STYE (*hordeolum*) is a small furunculus at the margin of the lid, often very painful. Successive crops very common. *Treatment.*—Foment with warm water, apply bread-and-water poultice ; puncture with a sharp lancet as soon as pointing has commenced. Improve the general health.

TARSAL TUMOUR. (*Meibomian cyst* ; *chalazion*), a chronic hypertrophy of a Meibomian gland, occurs as a small hard nodule from 1-4 mm. in diameter in upper or lower lids ; one or more may appear at the same time. The skin is freely movable over the tumour, which is hard and not painful. If left alone it generally causes thinning of the conjunctival tissue, or it may point through the surface. *Treatment.*—Evert the lid and remove by incision and scooping from the conjunctival

surface. When it points outwards it is better to remove through the skin by incision parallel to margin of eyelid. When thus thoroughly removed it does not recur. When only incised it may remain for some time.

WARTY GROWTHS occasionally appear on edges of lid. Remove freely with scissors.

MOLLUSCUM CONTAGIOSUM often appears in region of eyelids. Consists of one or more hemispherical elevations of from 1-6 mm. in diameter, containing sebaceous material. *Treatment.*—Divide each little tumour by vertical incision, and squeeze out the contents by means of the thumb-nails applied to the base of each.

RODENT ULCER (epithelial cancer ; rodent cancer) begins as a slight elevation near margin of eyelid ; this is followed by a shallow ulcer with slightly indurated edges, and generally a brownish incrustation. Mostly occurs in persons over forty. Progresses slowly. Seldom cicatrises. Attacks all surrounding tissues. Neighbouring glands not enlarged. *Treatment.*—Remove all the diseased structure with the knife, or with the thermal cautery, or by scraping, as early as possible. In severe cases apply chloride of zinc paste in addition, after removal with the knife.

SYPHILITIC ULCERS are more acute, more punched out in appearance, have less indurated margins, and are more amenable to treatment than rodent ulcers.

LUPUS generally occurs in younger subjects, and in other parts of the face. It is less indurated and more inflamed than rodent ulcer.

NÆVUS, often congenital, occasionally occurs on the eyelids, may be confined to the skin, or may involve subcutaneous tissue. *Treatment.*—1. By electrolysis. 2. By subcutaneous ligature. 3. By galvano-puncture.

PTOSIS is partial or complete closure of the upper eyelid. *Causes*, various. May be congenital and due to non-development of the levator palpebræ superioris muscle. May be due to paralysis of the third nerve, which supplies that muscle. May be the result of injury to that muscle.

Treatment varies with cause. 1. *Graefe's operation* ; make

incision through skin three lines above the margin of upper lid, and extending through its whole length, and expose the orbicularis palpebrarum muscle ; seize the muscle with forceps, excise a portion about five lines in width. In bringing edges of skin together pass the suture through the cut edges of the muscle. 2. *Pagenstecher's operation*, in which a subcutaneous ligature is inserted from above eyebrow to ciliary edge of upper eyelid. This is tightened daily until it comes away, leaving an indurated subcutaneous cord, by which the upper lid is rendered movable by the occipito-frontalis.

TRICHIASIS, ingrowing of the eyelashes, causing irritation of the globe. Frequently caused by contraction of the tissues after granular lids and after the application of caustics to inside of lids. *Treatment*.—If only a few lashes are turning in, these may be removed with epilation-forceps. If many exist, then excision of the hair-bulbs should be performed, or the whole row of lashes transplanted more externally by a plastic operation.

SYMBLEPHARON is union of the palpebral and ocular conjunctivæ or of the margins of the eyelids. Caused generally by burns, as with molten lead, or caustic, as quicklime. *Treatment*.—1. When the edges of only the lids are united, or when a probe can be passed beneath the united conjunctivæ ; (a) simply divide adhesions with knife, and keep the parts separated by means of oiled lint ; (b) pass a strong silk ligature beneath the bands, and tie tightly, allowing the ligature to come away by itself. 2. When no probe can be passed beneath the adhesions, the results of operation are less satisfactory. Separate the parts by incision, and then dissect up the conjunctiva on both sides, and endeavour to bring the flaps thus formed over the raw surface by means of very fine silk sutures ; still keep the ocular and palpebral portions apart by oiled lint.

ENTROPION.—Inversion of the eyelids, generally caused by cicatrices after granular lids, also after caustics, such as lime or nitrate of silver, or after injury. *Treatment*.—When very severe, and the conjunctiva is much contracted, remove the whole row of eyelashes, as recommended for trichiasis. When

less severe, perform Streatfeild's operation of grooving the cartilage.

ECTROPION.—Eversion of the eyelid; may be partial or entire. *Causes.*—Contraction after injury or inflammation of the parts of the eyelid which are external to the tarsal cartilage; or contraction of cicatrices of the face following burns, lupus, &c. *Treatment.*—Try to prevent the progress of eversion by skin-grafting on to wounds of face. When permanently established try a plastic operation.

Glaucoma is so called from the occasional greenish appearance of the pupillary area. The pathognomonic symptom in all cases of glaucoma is increased hardness or 'tension' of the eyeball.

Classification.—1. *Acute*; 2. *Chronic*; 3. *Secondary*.

ACUTE GLAUCOMA.—*Early Symptoms.*—Increased tension. Rapidly increasing presbyopia. Periodic dimness of sight. Haloes or 'rainbows' around the candle or other lights. Diminution of the field of vision. *Later Symptoms.*—Acute pain. Congestion of conjunctiva, and of ciliary region. Dilated and sluggish pupil. Rapid impairment of vision. Tension of globe much above normal, $T + 1$ to $T + 3$ or $T + 4$. The visual field is contracted. There may be turbidity of the vitreous, obscuring the fundus, otherwise the *ophthalmoscope* reveals—1. Cupping of the whole of optic disc, the edges being abrupt. 2. Probably pulsation of the retinal vessels. 3. Tortuosity of the veins. 4. Small haemorrhages occasionally.

CHRONIC GLAUCOMA presents the same symptoms as the acute form, but in a modified degree. The tension of the globe is above normal, $T + \frac{1}{2}$ to $T + 1$ or $T + 2$, but the increase of tension is less rapid. The pain is much less, and may be absent altogether.

SECONDARY GLAUCOMA is so called when occurring as a result or complication of some other disease or injury of the eye, as iridochoroiditis, needle operation, &c.

Pathology.—What is the cause of the increased tension? Theory 1. Active contraction of the sclerotic. 2. Excess of fluids of eye from increased supply of blood. 3. *Defective removal* of fluids from eye. 4. Enlargement of crystalline lens.

The region of the ciliary body is generally found to have undergone great changes. It becomes shrunken to half its natural size, its muscular fibers are atrophied and sclerosed. The base of the iris is found to be closely applied to the marginal part of the cornea. The ciliary arteries are enlarged. These changes are supposed to impede the escape of fluid from the anterior chamber, and perhaps from the vitreous also. The glaucoma cup is caused by pressure from within. The lamina cribrosa which forms the floor of the optic disc being the weakest part of the capsule of the eye, slowly yields, becomes depressed and hollowed out, causing atrophy.

Treatment for Acute Glaucoma.—Perform iridectomy without delay. (1) Make incision in the sclerotic. (2) Make wound large enough to allow of exit of one-fifth of iris. (3) Remove iris quite up to its ciliary attachment.

Apply leeches to eye, and warmth : give purgatives and derivatives internally.

In Chronic Glaucoma.—First try action of eserine drops, with local depletion, and improvement of the general health. If tension continues to increase, perform iridectomy as in acute cases.

Sclerotomy is sometimes preferred to iridectomy; it is performed as follows: The puncture and counter-puncture are the same as for iridectomy ; but, after the openings thus made have been slightly enlarged by slow sawing movements, the knife is withdrawn, leaving the central third of the sclerotic flap and the whole of the conjunctiva, except at the points of puncture, undivided.

Trephining the sclerotic behind the ciliary region has also been introduced ; but these are both less efficient than iridectomy.

Iris.—IRITIS.—Causes.—Syphilis. Rheumatism. Gout. Inflamed or ulcerated cornea. Injuries as in operation for cataract.

Symptoms.—(1) Change in colour ; (2) Change in mobility ; (3) Change in vascularity ; (4) Pain ; (5) Impairment of vision ; (6) Photophobia and lachrymation.

(1) *Change in colour* is due to congestion, and to effu-

sion of lymph and serum into the texture of iris, as well as, in part, to turbidity of aqueous. It looks blurred and 'muddy.'

(2) *Change in mobility* is indicated by the pupil not responding actively to light, but becoming sluggish or quite inactive. The iris becomes more or less adherent by its posterior surface to the capsule of the lens, constituting partial or complete *posterior synechia*; when *partial*, the pupillary margin becomes jagged under atropine; when *complete*, the pupil cannot be dilated by mydriatics. When exudation of a layer of lymph takes places into the pupillary area the condition is termed 'occlusion.' When margin of pupil is adherent to lens-capsule by its whole circumference the condition is termed 'exclusion.' The pupil is usually contracted.

(3) *Increase of vascularity* in the ciliary zone, around the margin of the cornea, generally occurs early, and the conjunctival vessels are generally congested.

(4) *Pain* of a neuralgic character in and around the eye, variable in degree.

(5) *Impairment of vision* is always more or less marked, may be owing to turbidity of aqueous, exudation of lymph on capsule in the pupillary area, impairment of accommodation by extension of inflammation to the ciliary body.

(6) *Photophobia and Lachrymation* may or may not be present.

In *Syphilitic Iritis* there is tendency to effusion of lymph, and formation of nodules in the structure of the iris. It seldom relapses; it is often symmetrical; pain not generally severe. In *Rheumatic Iritis* the effusion of lymph is slight, nodules are never formed, only one eye is usually affected at a time, although both eyes may suffer in turn; frequently relapses at intervals of months or years; congestion and pain often severe; sight not much affected.

Treatment.—(1) Use atropine drops (*atropiae sulph. gr. ij. ad ʒj.*) three times daily to prevent adhesions, or to break down those which may have recently formed, also to relieve pain and congestion.

(2) If pain and congestion be severe, apply leeches to

temple, malar eminence, or septum nasi ; repeat if necessary ; apply blister to temple ; avoid stimulants.

(3) For syphilitic iritis employ the treatment proper for secondary syphilis. For rheumatic iritis give alkalies, iodide of potassium, colchicum.

(4) Rest the eyes ; all eye-work to be discontinued ; order a shade for both eyes ; darken the room, or bandage the affected eye with a pad of cotton-wool, especially in rheumatic cases.

(5) Iridectomy should be performed (i.) in those cases in which judicious local and internal treatment has been tried for several weeks without benefit ; (ii.) where adhesions exist and attacks are recurrent ; (iii.) where there is complete exclusion of the pupil.

OPERATION OF IRIDECTOMY.—(1) Separate lids by a spring-stop speculum. (2) With lance-shaped knife (keratome) incise sclerotic one line from corneal margin, and let the point enter anterior chamber just in front of iris, keeping point well forward to avoid wounding the lens. (3) Introduce iris-forceps through wound, and seize iris near pupillary margin ; draw this out through wound and cut off with fine scissors.

ARTIFICIAL PUPIL is mostly made by (1) iridectomy ; but for cases in which this is unsuitable one of the following methods may be adopted :—(2) By using a broad needle and hook. (3) By division of iris with Wecker's scissors introduced into anterior chamber (iridotomy). This is only possible when the lens is absent.

Prolapse of Iris generally follows penetrating and incised wounds of cornea. *Treatment.*—(1) Return the prolapsed iris by the use of a blunt probe if possible, and use eserine drops (gr. ij. ad $\frac{3}{4}$ j.) if the wound is near the circumference, and atropine drops of the same strength if the wound is central. (2) If the hernia of the iris cannot be reduced and is recent, the protruding portion should be seized with iris-forceps and excised. (3) In either case apply a compress of wet lint over the closed eyelids. After some days a shade should be worn, and the eyes carefully watched.

Coredialysis is a partial detachment of the iris from its ciliary border, forming a second pupil. It is generally caused

by a sharp blow. Congenital irideremia (absence of iris) is occasionally seen.

Coloboma of the Iris (congenital cleft) appears like a very regular result of iridectomy downwards, or downwards and inwards ; usually symmetrical ; variable in degree ; generally associated with a corresponding defect in the choroid.

Mydriasis (dilatation of the pupil) is a derangement which may be caused by disease or by the action of mydriatic drugs, e.g., glaucomatous tension of the globe ; diseases of choroid or retina, optic atrophy, paralysis of third nerve. *Mydriatics*, sulphate of atropia, extract of belladonna, sulphate of duboisine, sulphate of daturine, &c.

Myosis (contraction of pupil) may be caused by spasmodic action of the circular fibres of iris, loss of power of radiating fibres of iris, hyperæsthesia of retina, affection of spino-sympathetic filaments which supply the radiating fibres of iris, myotic drugs, e.g., Calabar bean, sulphate of eserine, nitrate of pilocarpine.

LACHRYMAL APPARATUS.—Overflow of tears (lachrymation, epiphora, stillicidium) is caused by excessive secretion, or by some defect in the lachrymal apparatus which prevents the escape of the tears. This defect may exist (i.) at the puncta lachrymalia, which may be displaced or obstructed ; (ii.) in the canaliculi, which may be obstructed by stricture near the sac or by foreign body ; (iii.) in the lachrymal sac or nasal duct.

INFLAMMATION OF THE LACHRYMAL SAC is very common ; generally caused by *stricture of the nasal duct*. *Symptoms.*—Lachrymation, presence of a tumour (mucocele) at the inner canthus, which may often be emptied by pressure with the finger, the contents passing upwards through canaliculi, or downwards through nasal duct. The contents of the sac vary according to the character of the inflammation. At first it consists of viscid mucus, which may remain a long time, or may become semi-purulent ; in more acute inflammation there is abundant suppuration with swelling of surrounding parts, and pointing either through the skin, when a lachrymal fistula is established, or through the conjunctiva near the caruncle. *Treatment.*—1. Slit up the canaliculus, and so give free exit to

contents of sac. This may be done with Whitnall's director, or by passing a Weber's caniculus knife, or by a pair of delicate scissors. 2. Endeavour to cure the stricture of the nasal duct by passing a lachrymal probe every third day until lachrymation ceases. Various kinds of lachrymal probes are used, as Bowman's, Couper's, Weber's.

Fistula of lachrymal sac frequently occurs in acute inflammation—a small tortuous sinus between the sac and the skin, from which a continuous oozing of the tears on to the cheek takes place. *Treatment*.—(1) Cure the stricture and restore the mucous membrane to a healthy condition. (2) If necessary, pare the edges of fistulous opening, and bring together by fine suture.

Lachrymal Gland.—Hypertrophy, acute and chronic inflammation, abscess, fistula, cysts, sarcoma. *Removal* sometimes required for disease or for obstinate cases of lachrymation. *Operation*.—Make incision below upper and outer third of the orbital ridge through skin and the fascia; feel for gland with finger, seize with hooked forceps, draw forwards, sever with knife; do not close wound till haemorrhage has ceased.

Optic Nerve.—Diseases: Neuritis; Atrophy.

OPTIC NEURITIS may extend from the brain to the retina (descending); may commence at the optic disc (papillitis), and thence pass along the nerve (ascending). When the disc is affected there may be (a) simple congestion; (b) congestion with swelling, which renders the outline of the disc more or less obscure. *Causes*.—Cerebral tumour, meningitis, syphilis, albuminuria, lead-poison, wound of cornea, hypermetropia. The sight is affected in proportion to the change in the optic nerve fibres. There may be lessened acuteness of vision, limitation of field of vision, altered colour-perception. *Treatment*.—Endeavour to find the cause of the malady and treat this. Rest the eyes. In cases where syphilis is a known cause, give a prolonged but mild course of mercury and iodide of potassium. When syphilis is the probable cause, give iodide, and in the early stage give mercury also. In strumous cases pursue tonic treatment.

ATROPHY OF OPTIC NERVE may commence without any

visible inflammation of disc (primary), or may follow as a result of papillitis. The optic disc varies in appearance from slight pallor to bluish-white. The vessels may be of normal size, or may be much atrophied. *Treatment.*—Give quinine and iron internally. Phosphorus, nitrate of silver, and ergotinine are each sometimes employed. Try the interrupted voltaic current.

Retina.—The healthy human retina is so transparent during life that it is hardly seen with the ophthalmoscope. The vessels of the retina are seen radiating from the optic disc. Inflammatory and other deposits in the retina are also seen when present. The chief diseases of the retina are—Hyperæmia, Retinitis, Detachment, Embolism of the central artery, Glioma, Cysts.

HYPERÆMIA.—Generally caused by overwork, especially if patient be ametropic. Fundus looks too red, and optic disc has a pinkish, flushed appearance. *Treatment.*—Functional rest, local depletion by leeches or blister if necessary. Correction of ametropia by use of spectacles.

RETINITIS—(a) *Syphilitic*, (b) *Albuminuric*, (c) *Apoplectic*, (d) *Pigmented*.

SYPHILITIC RETINITIS.—One of the many secondary symptoms of syphilis—generally occurring between six and eighteen months after infection—occurs in inherited as well as in acquired syphilis. Ophthalmoscope shows a greyish-white haze around optic disc, patches of yellowish-white exudation over the fundus, generally more or less choroiditis, generally more or less turbidity of vitreous. *Treatment.*—Functional rest of eyes, general treatment for secondary syphilis.

ALBUMINURIC RETINITIS (Nephritic R.) may come on gradually with the advance of kidney disease; may be dependent on uræmia and occur in the later stages of kidney disease. May be caused by temporary albuminuria, as in that which occasionally occurs during pregnancy. In early stage sight may be unaffected. Ophthalmoscope shows a dull grey haze in central region of retina due to oedema, generally a few small patches of haemorrhage scattered over fundus. Optic disc may be also swollen. In advanced stage sight greatly affected in

one or both eyes. Central region occupied by numerous dots, spots, or patches of an opaque white substance grouped around the yellow spot. Hemorrhages are frequent, and usually have a striated appearance. Optic nerve sometimes inflamed (neuro-retinitis). Prognosis must be guarded. Treat disease of kidneys. Rest and protect eyes by cobalt-blue glasses.

RETINITIS APOPLECTICA.—From sudden haemorrhage from a retinal vessel, from disease of vessels, or of heart.

RETINITIS PIGMENTOSA.—Characterised by a peculiar deposit of dark pigment—varying in pattern—usually commences at the periphery of the fundus, and gradually approaches the centre. Optic disc of a pale yellow colour. Often associated with posterior polar cataract. Patient cannot see in twilight or at night (night-blindness). There is concentric limitation of the field of vision, which gradually proceeds from the circumference towards the centre. Often occurs in several members of the same family. Thought to be induced by consanguinity of marriage. *Prognosis* bad. May remain stationary. May go on from bad to worse.

DETACHMENT OF RETINA may be partial or entire. *Causes.*—(a) *Elongation of coats of eyeball*, as in extreme myopia ; (b) *Diminution of vitreous* ; (c) *Haemorrhage* or serous exudation between retina and choroid ; (d) *tumours of choroid*. *Symptoms.*—By direct examination the detached portion appears as a bluish-grey film bounded by a sharp line. The vessels traced from disc give a sudden bend at the line of detachment. The detached portion is seen to be pushed forwards, and the vessels upon it are tortuous, small, and of dark colour. The field of vision is limited. *Prognosis* is unfavourable.

GLIOMA, a small round-celled growth proceeding from the granular layers of the retina, occurring generally in very young children. It is seen as a glistening white substance at the bottom of the eye, and if allowed to remain, it rapidly spreads along optic nerve to the brain, and to the surrounding structures within the orbit. Secondary deposits may occur. *Treatment.*—Early excision of globe.

Refraction of the eye signifies the influence exercised by the transparent media upon rays of light entering it.

EMMETROPIA signifies normal refraction.

AMETROPIA signifies abnormal refraction, and may be divided into (1) *Myopia*, (2) *Hypermetropia*, (3) *Astigmatism*.

EMMETROPIA is that condition of refraction in which rays from distant objects, and which are practically parallel, come to a focus upon the retina when the eye is at rest, that is, when accommodation is relaxed. The *emmetropic* eye cannot see *near* objects without increasing the convexity of the crystalline lens, because the rays from near objects are divergent, and would therefore focus behind the retina. This change of shape in the lens is effected by the ciliary muscle, and is called *accommodation*.

The farthest distance of distinct vision in any state of refraction is called the *far-point*, the shortest distance of distinct vision is the *near-point*. The *near-point* and the *far-point* are found by means of test types. Those of Snellen and Jaeger are in common use. The distance between the *near-point* and the *far-point* is called the *range* or amplitude of *accommodation*. It is the distance over which the eye has command by means of its accommodation.

Accommodation, as we have seen, depends upon the contractility of the ciliary muscle, and upon the elasticity of the crystalline lens. Now, as age advances, the ciliary muscle gradually loses its contractility, and the lens its elasticity. So that in emmetropia the *near-point* gradually recedes from the eye. This recession commences at about the age of ten. Thus at the age of ten years the amplitude of accommodation is equal to a lens of 14 D., and the distance of the *near-point* from the eye is 7 centimètres, at fifteen years the distance is 8 cm.; at twenty years it is 10 cm.; at thirty years it is 14 cm.; at forty years it is 22 cm.; at fifty years it is 40.5 cm.

The *emmetropic* eye, therefore, can read No. 6 of Snellen's test types at the distance of 6 mètres without the aid of either convex or concave lenses ($V = \frac{6}{6}$) at *all ages*. It can read No. 1 of Snellen's test types for reading as near as 7 cm. up to the tenth year of age, but after that time there is a gradual recession of this *near-point*. At the age of forty years the *near-point* is 22 cm.

PREBESYOPIA (Old Sight) is that condition in which the near-point has so far receded as to cause discomfort in reading and fine work. This distance is about 22 cm. (8 inches). In the *normal eye* this distance (see **EMMETROPIA**) is reached at about forty years, so that after that age all fine work, such as reading, needlework, &c., must be held at more than 22 cm. from the eye. This inconvenience is easily overcome by prescribing convex lenses to be worn for reading and fine work. The following table will show the strength of the lens required by the normal eye at different ages, to correct for presbyopia :—

Age	Strength of Spherical Convex Lens in Dioptres.									

40	0
45	1
50	2
55	3
60	4
65	4.5
70	5.5
75	6
80	7

, In *hypermetropia* presbyopia comes on earlier than in emmetropia, because the hypermetropia has to be neutralised before any accommodation is available for near vision. Thus, suppose a hypermetrope of 2 dioptres,¹ what strength of lens would be required to correct his near vision at the age of fifty ? He will require first 2 D. to correct the hypermetropia, and, by the above table, we see that 2 D. would be the strength of lens required if he were emmetropic. Therefore $2 + 2 = 4$ D. ; or let x be the amount of hypermetropia expressed in dioptres, and x^1 the strength of lens required according to age, then x D. + x^1 D. will be the strength of the spectacles required for near vision. In *myopia* presbyopia comes on later than in emmetropia, because for the same amount of accommodation the near-point is always nearer than in the normal eye. In very high degrees

¹ The refractive power of lenses is now indicated by the metrical or dioptric system in optics, in preference to the old system of measurement by inches. The unit or standard of the new system is a lens of one metre focal length (1 D.). In order to convert the new into the old nomenclature we have only to remember that a mètre (dioptre) is nearly 40 inches, and that dividing 40 by the number of dioptres we obtain (approximately) the required focal length in inches. Thus suppose a lens of strength 2 D., and we want to know its strength in English inches, then $\frac{40}{2} = 20$ inches focal length.

of myopia (over 4.5 dioptres) the patient will never become so presbyopic as to require convex glasses for near vision, because in a state of repose the eyes are adapted for a shorter distance than 22 cm. He may, however, require concave glasses for *near* as well as for *distant* vision (see **MYOPIA**). Suppose a myope of 3 D. sixty years old, what spectacles would he require? We see by the table that, if emmetropic, he would require 4 D., and we know that he has myopia = -3 D. Therefore $+4 - 3 = +1$ D. will be the strength of spectacles required for near vision.

MYOPIA (Short Sight) is that condition of refraction in which *parallel* rays come to a focus in front of the retina, the eye being at rest. *Symptoms*.—Patient cannot see distant objects clearly, and if told to read small print (No. 1 of Snellen's test types) will hold it within the distance of his far-point from the eye. Vision improved by concave spherical lenses, made worse by convex lenses. *Retinoscopy* reveals a shadow which passes in the same direction as the reflected light. *Ophthalmoscopy*.—1. By *direct examination* with mirror alone, image of vessels of fundus seen at distance from eye, and moves in the opposite direction to the observer's head when the latter is moved from side to side. 2. By *indirect examination* the optic disc appears smaller than in emmetropia, and appears to increase in size on withdrawing the lens used. 3. By *direct examination*, when the instrument is held *close* to the patient's eye the retinal vessels, optic disc, and other details of the fundus cannot be clearly seen without the intervention of a concave lens, the strength of the lens required for this purpose being a *measure of the degree of myopia*. In many cases a crescentic patch of yellowish-white appearance (*myopic crescent*) is seen on the outer side of the optic disc; this is caused by atrophy of the choroid. In high degrees of myopia other patches of choroidal atrophy are often seen. Choroidal haemorrhages, and haemorrhages into vitreous, occasionally occur. *Causes*.—Too great length of globe. Too great curvature of cornea. Too high refractive power of media of eye. Hereditary tendency. Prolonged use of eyes in looking at close objects. *Treatment*.—Having ascertained accurately the

degree of myopia, order spectacles to be worn. 1. To give clear vision of objects at a distance (Nos. 6 to 60 Snellen's at 6 mètres). 2. To enable the patient to read small print (No. 1 Snellen) at the same distance as an emmetrope. In all cases of myopia below 6 or 7 dioptres, where the accommodation is good, glasses about 1 D. less than the total myopia should be used for near and for distant vision. They should, if possible, be worn constantly, but they cannot always be tolerated for reading. In most cases where the myopia is higher than 7 D., and in all cases where the *accommodation is feeble*, two kinds of spectacles must be worn ; one pair for distance, equal in strength to the degree of myopia, another pair for near vision, of lower power. The required strength of these is found in the following manner (Donders) :—*From the lens which exactly neutralises the myopia deduct the strength of a lens whose focal length is equal to the distance at which we wish the patient to work*. Thus suppose a myope of 10 D. wishing to read No. 1 Snellen at 40 cm. From 10 D. deduct the lens whose focal length is 40 cm., viz. 2.50 D. ; then $10 - 2.50 = 7.50$ D., and 7.50 D. is the strength of spectacle required. In prescribing for patients over forty proper allowance must be made for presbyopia (see PRESBYOPIA).

HYPERMETROPIA is that condition of refraction in which parallel rays come to a focus behind the retina—the eye being at rest.

Causes.—1. Most commonly the axis of the eye is too short. 2. The curvature of the cornea or of the surface of the lens may be insufficient. 3. The refractive index of the media may be too low. The disease is frequently hereditary.

Symptoms.—Since rays from a distant object (parallel rays) come to a focus *behind* the retina, it follows that rays from a near object (*divergent rays*) will be focussed still further *behind* the retina, and therefore a hypermetrope is unable to see anything clearly, either distant or near, without using accommodation. If, therefore, the *hypermetropia be slight*, and the accommodation powerful, there will be no inconvenience, either for near or distant vision. But if the accommodation is failing, as it always does from age, and as

it frequently does from disease, the patient cannot see near objects for long together without aching pains and sense of fatigue in the eyes, combined with dimness of vision. In *high degrees* of hypermetropia the greater part of the accommodation is required for distant vision, and the patient is never able to see near objects clearly. The symptoms therefore vary with the degree, and become more manifest as age advances. Hypermetropia is frequently an indirect cause of squint (see STRABISMUS). The objective symptoms are as follows:—

1. *Retinoscopy* reveals a shadow which passes in the opposite direction to that of the reflected light.

2. *Ophthalmoscopy*.—*Direct method* at a good distance from the eye shows the image of vessels of fundus, and this image moves in the same direction as the observer's head when the latter is moved from side to side.

Indirect method shows size of disc to diminish on ~~with~~ drawing the lens from patient's eye.

Direct method.—When oblique mirror is used close to the patient's eye, and the accommodation both of patient and observer relaxed, no clear detail of fundus can be made out without the aid of a convex lens. The strength of the lens thus required to make quite clear the detail of fundus gives an exact *estimate of the degree of hypermetropia*.

3. *By means of Test-types and Test-glasses*.—See if patient can read Nos. 6 to 60 Snellen at 6 mètres. Then if he can read the same as well or better with a convex glass, the highest glass with which he gets the best vision is a measure of his *manifest* hypermetropia. In children, and in all cases where spasm of the ciliary muscle is suspected, it is necessary to paralyse the accommodation by atropine drops, in order to obtain the *latent* as well as the *manifest*, that is, the total hypermetropia.

Treatment.—Having found the degree of hypermetropia, order spectacles to be worn as follows: 1. In children and young adults order the constant use of glasses both for near and distant vision; the strength of these should be equal to all the *manifest* hypermetropia *plus* half the *latent*. Patient may complain of inconvenience, but should persevere. 2. In

persons over forty years of age order glasses as directed under **Presbyopia** (see **PRESBYOPIA**).

ASTIGMATISM is *Regular* or *Irregular*.

REGULAR ASTIGMATISM is that condition in which the refraction is different in different meridians of the same eye; the two principal meridians being always at right angles to each other.

IRREGULAR ASTIGMATISM is that condition in which there are different degrees of refraction in different parts of the various meridians. *Regular Astigmatism* may exist in five different forms.

1. *Simple Myopic*.—One meridian emmetropic and the other myopic.

2. *Simple Hypermetropic*.—One meridian emmetropic, the other hypermetropic.

3. *Compound Myopic*.—Both meridians myopic, one more than the other.

4. *Compound Hypermetropic*.—Both meridians hypermetropic, one more than the other.

5. *Mixed*.—One meridian myopic, the other hypermetropic.

Causes.—Chiefly unequal curvature of cornea, perhaps irregularity of lens also. *Symptoms* vary with the *kind* and the *degree* of astigmatism. The lower forms often pass unheeded till rather late in life. The higher forms cause such fatigue and distress that the eyes are disqualified from prolonged exertion. Astigmatism must always be suspected when by testing with spherical lenses the patient cannot be made to ~~read~~ Nos. 6 or 9 Snellen at 6 mètres (the fundus being otherwise healthy). When astigmatism is suspected, proceed to examine each eye carefully as follows:—

1. *Retinoscopy*.—The intensity, direction, and velocity of shadow will indicate the *kind* of error in each meridian.

2. *Ophthalmoscopy*.—By indirect examination the optic disc appears *oval* instead of circular, and by withdrawing the lens used away from the patient's eye the disc appears to change its shape. By direct examination, the mirror being held close to the patient's eye, the vessels of the different meridians may be seen with lenses of different powers the difference between

the powers of the lenses thus used being an exact measure of the degree of astigmatism.

3. Place patient at distance of six mètres from Snellen's test types, and with spherical lenses correct the ametropia as far as possible. Then rotate in front of the correcting lens a stenopäic slit; by this means the two principal meridians will be found, and must be corrected seriatim. The difference of power between the lenses which correct these two meridians is an exact measure of the degree of astigmatism. The same object may be effected by the use of cylindrical glasses without the slit.

4. An excellent instrument for finding the true meridians is Tweedy's Optometer (see *Lancet*, October 28, 1876).

Whatever means be employed in diagnosis, *cylindrical* lenses should be prescribed which fully correct the astigmatism. The patient may not be able to see very much at first, but by the *continued use* of spectacles the vision will generally improve.

Strabismus (Squint).—The visual line is the axial line joining the centre of the object observed with the centre of its image on the yellow spot of the retina. Deviation of the eye from the visual line, so that the image does not fall on the yellow spot, but on some other part of the retina, is called squint. This deviation may produce double vision—*diplopia*—when the image formed by the squinting is usually fainter than that of the other eye, and is called the *false* image. When the false image appears on the same side of the true image as the deviating eye, the diplopia is termed *heteronymous*, when on the opposite side the diplopia is *crossed*. The greater the deviation of the eye the fainter the image appears, as it falls more upon the periphery of the fundus. Patients learn to disregard the false image, and so to use one eye at the time or one eye only. *Causes of squint.*—(a) Ametropia. (b) Affection of ocular muscles, as over-action, weakness, paralysis. (c) Disuse of eye. Chief kinds are internal and external.

INTERNAL STRABISMUS (Convergent).—Very common, generally caused by hypermetropia. In hypermetropia the patient is obliged to use accommodation in order to see even distant

objects. Now accommodation is always accompanied by convergence, and when a near object has to be seen, the accommodation and, consequently, the convergence used are so great that the eyes deviate internal to the visual line, so that the image does not fall upon the yellow spot, and is therefore not distinct. Patient then fixes one eye upon the object, *i.e.* causes it to move in the direction of the visual line whilst the other eye still deviates. The amount of deviation is measured by the distance between two vertical lines, one bisecting the pupil, the other bisecting the eyelids. *Diagnosis.*—In well-marked cases let patient look steadily at the tip of index-finger placed about a foot in front of eyes, then screen each eye successively and watch the eye thus screened. The squinting eye makes a decided movement towards the visual line when the working eye is covered, but the working remains quite stationary when the squinting is screened. In less marked cases the diagnosis is more difficult. Take patient into dark room and direct him to look steadily at lighted candle at a distance of ten feet without moving his head. Place a piece of red glass in front of one eye ; then if diplopia be present the image of this eye will be red and that of the other eye of normal colour. The distance of these images apart and their relative positions give the character of the deviation—homonymous diplopia indicating convergent, and crossed diplopia indicating divergent strabismus. *Treatment.*—1. If the patient be hypermetropic, if squint be slight and of recent date, and if vision be good in both eyes, try the effect of well-fitting convex spectacles for one or two months. 2. Perform **TENOTOMY** of the internal rectus of one or both eyes. Both eyes generally require to be operated on. *Operation.*—Separate lids by stop-speculum, let assistant turn eye outwards by forceps, with toothed forceps pinch fold of conjunctiva between cornea and caruncle, with squint-scissors cut through this and through the capsule of Tenon, pass squint-hook beneath the tendon from below and cut it through between hook and globe, pass in the squint-hook a second time to be quite sure that the tendon is divided ; suture for conjunctival wound is not generally used.

EXTERNAL STRABISMUS (Divergent) is the result of weak-

ness of the internal rectus ; commonest in myopia ; occasionally occurs in hypermetropia ; sometimes occurs in a blind eye ; may follow tenotomy of internal rectus where too much subconjunctival tissue has been divided ; common in partial or complete paralysis of the third nerve. *Diagnosis*, the same as for internal strabismus. *Treatment*.—If resulting from paralysis, try and find the cause of paralysis, and treat this : if not from paralysis, perform tenotomy of the external rectus, and if necessary also, at the same sitting, perform the operation for *readjustment or advancement* of the internal rectus. This is done in various ways, and consists of separation of the muscle from its insertion into sclerotic, and bringing it further forward on sclerotic by means of sutures passed through the muscle and attached to conjunctiva close to cornea.

LIST OF WORKS CONSULTED IN THE FOREGOING NOTES.

Wecker and Landolt—*Traité Complet d'Ophthalmologie*, 1879.
Wecker—*Chirurgie Oculaire*.
Donders—*Anomalies of Accommodation and Refraction*.
Pagenstecher and Geath—*Atlas of the Pathological Anatomy of the Eye-ball*.
Graefe and Saemisch—*Handbuch der Augenheilkunde*.
Soelberg Wells—*Diseases of the Eye*.
Nettleship—*Diseases of the Eye*.
Lawson—*Diseases and Injuries of the Eye*.
Brudenell Carter—*Diseases of the Eye*.
Gowers—*Medical Ophthalmoscopy*.
Streatfeild—Chapter on 'Ophthalmic Surgery' in Erichsen's *Surgery*.
Juler—*Handbook of Ophthalmic Science and Practice*.

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